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Applicability analysis of performance based logistics implementation for the U.S. Army Stryker Armored Vehicle to improve Turkish Army weapon system support

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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

Applicability Analysis of Performance Based Logistics Implementation for the U.S. Army Stryker Armored Vehicle to Improve Turkish Army Weapon System Support

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June 2007

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APPLICABILITY ANALYSIS OF PERFORMANCE BASED LOGISTICS IMPLEMENTATION FOR THE U.S. ARMY STRYKER ARMORED VEHICLE TO IMPROVE TURKISH ARMY WEAPON SYSTEM SUPPORT

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LIST OF ACRONYMS

ACAT	:	Acquisition Category
ACV	:	Armored Combat Vehicle
AMC	:	Army Material Command
AMSAA	:	Army Material System Analysis Activity
AOR	:	Area of Responsibility
ASL	:	Authorized Stockage List
BCA	:	Business Case Analysis
BCT	:	Brigade Combat Team
COTS	:	Commercial off-the-shelf
DAG	:	Defense Acquisition Guide
DAU	:	Defense Acquisition University
DIEC	:	Defense Industry Executive Committee
DLA	:	Defense Logistics Agency
DMS	:	Diminishing Manufacturing Sources
DoD	:	Department of Defense
FCS	:	Future Combat System
FMC	:	Fully Mission Capable
FRP	:	Forward Repair Plant
GAO	:	Government Accountability Office
GCSS-A	:	Global Combat Support System-Army
GDLS	:	General Dynamics Land Systems
GM	:	General Motors
IBCT	:	Interim Brigade Combat Teams
ICLS	:	Interim Contractor Logistics Support
IPT	:	Integrated product team
LAV	:	Light Armored Vehicle
LCC	:	Life cycle cost
LPTA	:	Lowest price technically acceptable
MC	:	Maintenance Center
MND	:	Turkish Ministry of National Defense
MOA	:	Memorandums of Agreement
MOU	:	Memorandums of Understanding
NAVICP	:	Naval Inventory Control Point
O&M	:	Operation and Maintenance
OEM	:	Original Equipment Manufacturer
OIF	:	Operation Iraqi Freedom
OPTEMPO	:	Operating Tempo

OSD	:	Office of the Secretary of Defense
PBA	:	Performance Based Agreement
PBC	:	Performance Based Contracting
PBL	:	Performance Based Logistics
PLL	:	Prescribed Load List
PM	:	Project Manager, Program Manager
PPL	:	Public Procurement Law
PSI	:	Product Support Integrator
RFID	:	Radio Frequency Identification
ROI	:	Return on Investment
SBCT	:	Stryker Brigade Combat Team
SCM	:	Supply Chain Management
SLA	:	Service-Level Agreements
STAMIS	:	Standard Army Management Information System
STP		Strategic Target Plans
TACOM	:	U.S. Army Tank, Automotive and Armament Command
TAF	:	Turkish Armed Forces
TLCLS	:	Total Life Cycle Logistics Support
TLCSM	:	Total Life Cycle System Management
TLFC, TLF	:	Turkish Land Forces (Army) Command
TLFLC	:	Turkish Land Forces (Army) Logistics Command
TOW-ITAS	:	TOW Improved Target Acquisition System
TYPP		Ten Year Procurement Programs
USD(AT&L)	:	Undersecretary of Defense (Acquisition, Technology and Logistics)
USDI	:	Undersecretariat of Defense Industries-Turkey

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I. INTRODUCTION

A. PURPOSE

This research project primarily focuses on the successful implementation of Performance Based Logistics (PBL) and Performance Based Contracts (PBC) for systems acquisition and support of a particular weapon system throughout its life cycle. The purpose of this research is to make recommendations to stakeholders such as Project Manager (PM), logistics support providers, third party logistic partners, and war fighters. The warfighter's logistics support, regardless of where and when to provide support, is one of the primary challenges. Thanks to recent strategic and technological progress in the global supply chains idea, this challenge seems to be easier to deal with.

This thesis mainly focuses on the Armored Combat Vehicle (ACV) acquisition project accomplished by the Turkish Ministry of National Defense (MND) for the Turkish Army. Figure 1 shows the Turkish Army's Advanced ACV. Although mostly traditional methods have been followed in the acquisition and support process, it is our belief that innovative improvements may be achieved for future system total life cycle logistic support (TLCLS) by using this particular example adapting to the structural, cultural and environmental differences. We find it extremely useful for the international stakeholders to analyze and compare the TAF procurement process with the one for the U.S. Army Light Brigade STRYKER Light Armored Vehicle (LAV), shown below in Figure 2. However, the PBL approach has not been fully performed during its acquisition and it is very likely that the future of the TLCLS will mostly depend on best practices of PBL and PBC. This approach is expected to provide better insights about potential benefits of PBL and PBC for overall weapon system support in the view of the Supply Chain and TLCLS concepts.

Figure 1. Turkish Army Armored Combat Vehicle (ACV) Platform (Retrieved from www.ssm.gov.tr on February 12, 2007)

Figure 2. U.S. Army STRYKER Light Armored Vehicle (LAV) (Retrieved from http://www.freerepublic.com/focus/news/1138809/posts on February 12, 2007)

B. BACKGROUND

Army transformation has to be properly supported with logistics transformation. The U.S. Armed Forces, the U.S. Army in particular, form an important and giant business defined as managing a huge financial budget. In an effort to transform

traditional logistics support for weapon systems, the DoD has identified PBL as a key strategy to transform a weapon system support. The Office of the Secretary of Defense (OSD) has defined PBL as:

> A strategy for weapon system product support that employs the purchase of support as an integrated performance package designed to optimize system readiness. It meets performance goals for a weapon system through a support structure based on performance agreements with clear lines of authority and responsibility (Undersecretary of Defense (AT&L), 2003).

The DoD Directive 5000.1 also holds PM responsible and accountable primarily to develop and implement PBL strategies in such a way as to optimize total system availability while minimizing cost and logistics footprint. Sustainment strategies include the best use of public and private sector capabilities through government/industry partnerships, in accordance with legal requirements (Undersecretary of Defense (AT&L), 2003).

One objective of the PBL approach is to increase accountability instead of the traditional control usage. All efforts focus on identification of the performance outcomes and responsibility assignments in the PBL (Gansler and Lucyshyn, 2006). PBL is a strategy for weapon system acquisition and product support that meets performance goals for a weapon system through a support structure based on long-term performance agreements (Defense Acquisition University [DAU], March 2005a). It is not only a strategy to procure the weapon systems, but also a method to support and supply necessary spare parts, maintenance and services throughout the lifecycle of weapon systems.

Defense Acquisition University (DAU) has developed and proposed a 12-step PBL implementation model to use with the acquisition and support of major defense systems. The development and management of PBL arrangements consist of twelve steps which may be modified or tailored to meet the needs of an Integrated Project Management team (PM). The 12-step model will be explained and details of implementing each step will extensively be discussed in Chapter III.

USD(AT&L) announced the PBL as the preferred long-term weapon systems acquisition and support strategy. Recommended steps are not necessarily applicable in the same format and timeline for each acquisition. Program Manager (PM) is expected to transform the recommended steps to fit the needs of the acquisition process.

C. PRIMARY AND SUPPLEMENTARY PROBLEM IDENTIFICATION QUESTIONS

The idea of Supply Chain logistics to supply and support the war fighters around the globe necessitates the use of efficient and result-oriented acquisition processes to procure and support key weapon systems on a timely basis. DoD has approved the PBL approach as the recommended acquisition and logistic support model. The objective of this research is to look at the logistics life cycle of the Turkish Army's advanced ACV in the light of DAU's PBL approach and make recommendations for future Turkish Ministry of National Defense (MND) acquisition projects in partnership with the defense industry. The primary problem identification question for this research is:

> How can DoD's preferred Performance Based Logistics model be applied to total life cycle logistics support transformation in terms of Turkish Army ACV supportability? Based on the research on implementation of the PBL model for U.S. Army's Stryker armored vehicle project what benefits are expected to be gained in Turkish Army system support?

The author developed the following supplementary research questions to look up the implementation methodology, problematic areas, improvement opportunities, and recommendations for Turkish military logistics improvement:

1. How do we identify and analyze the problem areas in regard to implementing PBL successfully for total life cycle system management (TLCSM)?
2. How did the U.S. Army perform DAU's 12-step Implementation model in support of Stryker vehicles?
3. How can the Turkish Army implement the 12-step approach to the Turkish Army's ACV support? What are the constraints and limitations in implementing PBL?

4. Considering that the Turkish Army would like to transform logistics via the Logistics Management System strategy, what are the benefits and limitations in terms of PBL implementations for overall system life cycle support?

D. SCOPE AND LIMITATIONS

The Performance Based Logistics (PBL) concept describes the procurement of support at a predetermined level of performance instead of spare and repair parts. The idea of getting total life cycle system management (TLCSM) throughout weapon system life cycle support is emerging through successful implementations of DoD and armed services. The absence of business case studies for Turkish Army ACV support to use as a benchmark is a limitation of this study. The weapon system in this research has already been fielded for over ten years. Traditional approach has widely been utilized to provide support and maintenance for the Turkish ACV since its fielding. This basically tells us that acquisition and systems support are considered separately. And the outsourcing is available for component, spare parts procurements and limited servicing. This study is focused on providing reliable information, recommendations to use in the system acquisition and support made by Turkish MND and propose further areas for research on how to use PBL as a means of Turkish Army logistic transformation.

The unavailability of the information related to PBL, PBC implementation and complexity of measures used to evaluate supportability for the selected systems might impact one or more areas of analysis during the progress of this study. To overcome this limitation reasonable assumptions have been made where suitable.

E. ORGANIZATION OF THE THESIS

This thesis looks at how the U.S. Army is implementing PBL for major system support. The Stryker Armored Vehicle support strategy is selected to analyze and create relevant information and recommendation to improve the Turkish Army acquisition processes. In this study, the savings potential and additional benefits are examined for the PBL model to promote acquisition processes in terms of Turkish Army ACV.

In Chapter II, military supply chain management and total life cycle logistics support (TLCLS) are going to be briefly reviewed. The reason for this is that they provide a broader viewpoint in terms of explaining the potential and additional benefits of PBL.

Chapter III will provide a literature review to clarify the general guidelines of performance based logistics. This chapter also includes an explanation of how the 12-step model is intended to be used in support of major weapon systems.

In Chapter IV, a brief background on the Turkish government acquisition laws and regulations, procedures followed by Turkish Army supply and support organizations, roles and responsibilities will be provided. The procurement and support functions will briefly be explained in this chapter as well.

Chapter V includes a review of how the 12-step model is implemented in support of the U.S. Army Stryker Combat Vehicle acquisition and selected support strategy. The acquisition and support strategy for the Turkish Army ACV and its phase-by-phase examination will be analyzed as well. This chapter is dedicated to the overall comparison between the PBL 12-step model for the Stryker LAV and traditional support model implemented for the Turkish ACV.

Finally, in Chapter VI the author attempts to make recommendations to improve the acquisition and support process of the Turkish Army based on results from PBL and traditional support models.

F. SUMMARY

This chapter introduced the purpose of the research, background on performance based logistics applications, problem identification questions, scope and limitations followed by the organization of the thesis. In the next chapter, supply chain and total life cycle system management concepts will be reviewed in a broader sense overlooking the military performance based logistics implementation.

II. SUPPLY CHAINS AND TOTAL LIFE CYCLE SYSTEM MANAGEMENT

A. INTRODUCTION

It is the goal of this chapter to make the reader familiar with an overview of how performance based logistics (PBL) emerged and evolved. It is conceptualized on the supply chain management (SCM) and total life cycle system management (TLCSM).

The use of global, effective supply chains through the primary support provider is seriously considered as an indispensable component of providing weapon system support. Effective supply chain strategy is an inevitable benefactor to gain competitive advantage for the industry.

The public sector also discovered the potential savings and increased opportunities of performance through specific precautions of partnerships. Public institutions are struggling to adapt supply chain management (SCM) and life cycle logistics (LCL) strategies in order to gain additional performance in return for less total ownership costs. The DoD and military services refers to it as Total Life Cycle System Management (TLCSM).

B. SUPPLY CHAIN MANAGEMENT AND TOTAL LIFE CYCLE SYSTEM MANAGEMENT

The supply chain management concept comes with numerous definitions. According to Ellram et al., supply chain management is the management of information, processes, goods and funds from the earliest supplier to the ultimate customer, including disposal (Ellram, Tate, and Billington, 2004, 17). This definition points out the foremost and inevitable relationship between the primary logistics provider and the end user in order to gain the benefits expected from the supply chain management processes.

According to Kumar, a supply chain is a network of organizations and their associated activities that work together, usually in a sequential manner, to produce value for the consumer (Kumar, 2001, 58).

The SCM has a potential to include the customer as a partner in supplying their needs in a supply chain. Integrating the customer into management of the supply chain has some advantages (Fredendall and Hill, 2001, 237):

1. Initially, integration improves the flow of information throughout the supply chain. In the typical supply chain, the farther the members of a chain are from end customer, the less understanding these members have of the needs of the customer. This increases supply chain uncertainty and complicates planning. As the uncertainty decreases, the firms start to preplan more efficiently. This allows less on-hand inventory and shortened lead times.
2. The product development function is integrated directly with the other functions in the firm. The integration allows R&D personnel to communicate more with the customer, which decreases the firm's response time and tends to reduce product development time.

Due to the globalization of the resource availability, companies using global supply chains benefited by gaining a competitive advantage over their rivals. The globalization of critical resources makes it essential that professional practice is improved and regarded as a key element in the preparation of organization strategies (Quayle, 2006, 360).

Service departments spend millions of dollars in order to acquire and provide logistic support throughout the life cycle of weapon systems, which are vital for the warfigher to accomplish his mission. Sustainability of these invaluable assets depends mostly on fast, reliable and effective supply chain structure and related business practices in partnership with original suppliers. The core SCM strategies applicable to commercial sectors can become an indispensable cost saving methodology for TAF in return for increased operational capabilities. The author believes that as supply chain initiatives bring about expected results in terms of savings in total system support, new opportunities will be realized resulting in increased savings in system acquisition and supportability costs without deteriorating the deterrence and lethality of the warfighters.

It is possible to break out of the conventional functional differentiation between purchasing and manufacturing and to consider a more integrated perspective that links both in a framework for supply chain strategy (Quayle, 2006, 360). A study identified the strategic value of supply chains in 2003-2004, as supply chain logistics practices and initiatives perceived positions and impacts, based on interviews with protagonists of 19 major practices and initiatives in the field. This is depicted below in Figure 3. The newest practices and initiatives start at the upper right. When a new practice or initiative comes on the scene, industry people often perceive it as strategic. Most new practices are perceived as providing an advantage for the business, either as cost reduction, revenue enhancing, or some form of customer retention and attraction (Cavinato, 2005, 148). Supply chain methodology is perceived as a strategic approach for the industry to keep its fair share while acquiring total ownership cost savings and better performance in government-owned weapon system sustainment.

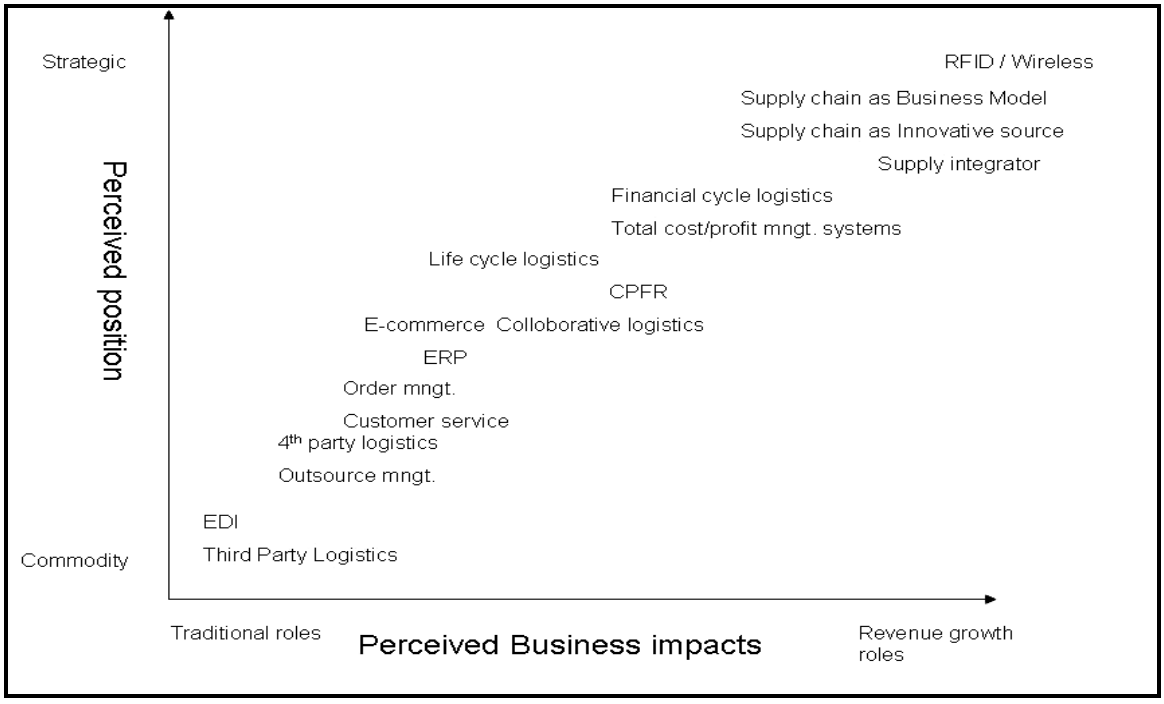

Figure 3. Supply Chain Logistics Practices and Initiatives: Perceived Positions and Business Impacts (Cavinato, 2005, 148)

Figure 3 shows that supply chain strategies supported by appropriate information technology (e.g., RFID) increase the profitability and impacts the supply chain business roles (Cavinato, 2005, 148).

C. TOTAL LIFE CYCLE SYSTEMS MANAGEMENT (TLCSM) CONCEPT

The cost of supporting invaluable and complex military systems (new or fielded) during the acquisition and life cycle phases is often in excess of two-thirds of the total cost of ownership. The management approach used to predict, budget, validate and control overall acquisition and support costs is known as total life cycle systems management (TLCSM).

1. The Principal Goals of DoD Life Cycle Logistics

The principal goals of DoD Life Cycle logistics are as follows (Defense Acquisition University [DAU], March 2005b):

- Influence product design for affordable System Operational Effectiveness.
- Design and develop the support system utilizing Performance Based Logistics (PBL).
- Acquire and concurrently deploy the supportable system, including support infrastructure.
- Maintain/improve readiness, improve affordability, and minimize logistics footprints.

Product acquisition and sustainment have traditionally been separate and not necessarily equal concerns. The government's primary focus has been on the acquisition, technology and systems. Additionally, the secondary concerns include system sustainment, technology transfer and the development of an industrial base for long-term system support (Berkowitz et al., 2004). Aligning project management methodologies therefore requires that the sustainability consequences of these assets and product life cycles must be considered during the project life cycle. A comprehensive sustainability evaluation framework is therefore required to assess projects during the early life cycle phases in terms of sustainability consequences of future implemented products (Labuschagne and Brent, 2005, 159). TLCSM is the planning for and management of the entire acquisition life cycle of a DoD system (Defense Acquisition University [DAU], December 2004). It helps to improve performance translated into more asset availability

to the combatants while diminishing ownership costs and logistic footprints in the theater of operations. Figure 4 depicts the linkage between life cycle logistics and the DoD acquisition process.

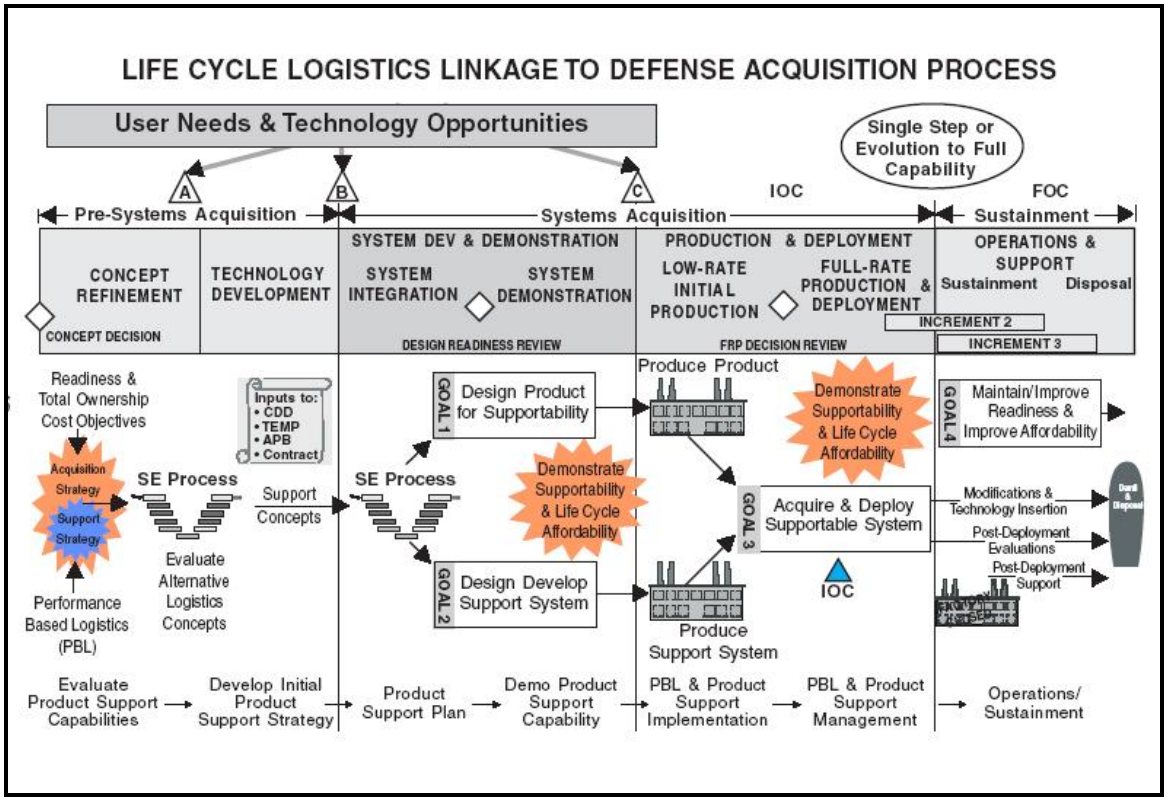

Figure 4. Linkage between Life Cycle Logistics and DoD Acquisition Process (Defense Acquisition University [DAU], March 2005b)

The ultimate goal in an acquisition strategy is to build both long-term partnerships and relationships that align the goals of all for the duration of the program (Berkowitz et al., 2004).

DoD primary policy (DoD Directive 5000.1, May 12, 2003) states that:

> The PM shall be the single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment…PMs shall consider supportability, life cycle costs, performance, and schedule comparable in making program decisions. Planning for Operation and Support and the estimation of total ownership costs shall begin as early as possible. Supportability, a key component of performance, shall be considered throughout the system life cycle.

The primary intent of TLCSM is to improve weapon system sustainment by establishing clear lines of responsibility and accountability for meeting specified warfighter performance requirements within the program management office (Deputy Assistant Secretary of the Army [ILS], 2004).

Under TLCSM, the PM is responsible for the development and documentation of an acquisition strategy to guide program execution from initiation through procurement of systems, subsystems, components, spares, and services beyond the initial production contract award, during post-production support, and through retirement (Defense Acquisition University [DAU], March 2005a).

2. PM's Responsibilities in TLCSM of a Weapon System

PMs will be held responsible for the overall management of the weapon system life cycle to include the following activities (Deputy Assistant Secretary of the Army [ILS], 2004):

- Timely acquisition of weapon systems, meeting warfighter performance requirements;
- Integration of sustainability and maintainability during the acquisition process;
- Weapon system sustainment to meet or exceed warfighter performance requirements throughout the life cycle at the best corporate value to the DoD and Military Services.

The TLCSM bases major system development decisions on their effect on life cycle operational effectiveness and affordability. The TLCSM encompasses, but is not limited to, the following (Defense Acquisition University [DAU], March 2005a):

- Single point of accountability to accomplish program logistics objectives including sustainment.
- Evolutionary acquisition strategies, including product support.
- An emphasis on life cycle logistics in the systems engineering process.
- Supportability as a key element of performance.

- Performance based logistics strategies.
- Increased reliability and reduced logistics footprint.
- Continuing reviews of sustainment strategies.

Implementation of the TLCSM business approach means that all major material alternative considerations and all major acquisition functional decisions demonstrate an understanding of the effects on consequential operations and sustainment phase system effectiveness and affordability (Defense Acquisition University [DAU], March 2005a).

D. SUMMARY

In this chapter, the author familiarized readers with an overview of concepts on how the PBL approach emerged and evolved in the industry. The supply chain management (SCM) and Total Life Cycle Logistics System Management (TLCSM) concepts are defined briefly for the purpose of military utilization. This chapter provided the reader with background information on SCM and TLCSM concepts. In the next chapter, DoD's preferred support concept PBL, its definitions and comprehensive overview of the Defense Acquisition University's 12-step PBL model is covered.

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III. LITERATURE REVIEW ON PBL IMPLEMENTATION

A. INTRODUCTION

This chapter will provide readers with a literature review on PBL and Defense Acquisition University's (DAU) 12-step PBL implementation model. Performance based contracting (PBC) is perceived as an inherent part of PBL application in this study.

Performance based logistics (PBL) is an approach that has become important in the Department of Defense (DoD) logistics environment. This new approach originally emerged from the idea of the commercial supply chain practices that helped firms to be cost effective.

B. THE ROLE OF PBL IN DEFENSE SYSTEMS ACQUISITION

DoD identified the potential benefits of PBL and Performance based contracting (PBC) as transformational and very effective logistic strategies. It is believed that DoD must initiate organization level transformation efforts about logistics. Former Army Chief of Staff General Eric G. Shinseki stated that it is not possible to talk about Army transformation without a logistics transformation. Considering this viewpoint, the Turkish Army needs to utilize concepts to initiate logistics transformation. DoD must utilize many of the necessary tools and concepts that have already been proven in the commercial world (Gansler and Lucyshyn, 2006).

The current defense logistics (DoD) budget is well over $100 billion and is a very big business (Gansler and Lucyshyn, 2006). In order to facilitate DoD's logistics transformation, DoD and service commands initiated various projects to adapt and apply private sector best practices. According to research, while it took five months for U.S. troops and equipment to be deployed to the Persian Gulf during the Gulf War in 1991 and the average order to receipt time was forty-nine days, this time has been reduced to an average of twenty-one days. However, this improvement must be considered in the view of the world-class commercial distribution that guarantees delivery within 1-2 days

domestically, and 2-4 days internationally, with over a 99 percent reliability (Gansler and Lucyshyn, 2006). PBL is such a strategy to help in improving performance of acquisition and support processes.

The over-increasing need to connect performance with logistic sustainability has started new ways of evaluating and rediscovering PBL as DoD's strategic approach to systems acquisitions and support. PBL is an acquisition reform that is intended to improve weapon systems logistics by reducing cost, improving reliability and reducing footprint. PBL is an extension of a broad process of rationalizing and, in many cases, outsourcing government services (Doerr, Lewis, and Eaton, 2005, 164).

1. Definition

The Defense Acquisition Guidebook (DAG) gives a defense-focused PBL description as follows (Defense Acquisition University [DAU], December 2004):

> Performance Based logistics is the purchase of support as an integrated, affordable, performance package designed to optimize system readiness and meet performance goals for a weapon system through long-term support arrangements with clear lines of authority and responsibility. To be more concise, PBL strategies buy outcomes, not products and services.

The goal of both acquisition and sustainment is to gain the most efficient and effective performance for a weapon system throughout its life cycle. In doing so, it is important to realize that acquisition and sustainment are not separate but simultaneous and integrative issues that require analysis and synthesis throughout the product life cycle (Berkowitz et al., 2004).

PBA and PBL research is mainly based on systems' performance which is necessary to provide mission capable assets for the warfighters to accomplish their mission. The main purpose of the PBA and PBL is linking the defense acquisition and support activities with the warfighters' needs in the long term agreements with the support providers, both organic and non-organic. Successful PBL implementation provides the same level of support within lower costs while diminishing logistics footprints.

PBL is DoD's preferred approach for product support implementation. The PBL implementation will meet the warfighter's operational requirements and be cost effective as validated by Business Case Analysis (BCA). PBL utilizes a performance based acquisition strategy that is developed, refined and implemented during the systems acquisition process for new programs or as a result of an assessment of performance and support alternatives for fielded systems (Defense Acquisition University [DAU], March 2005a).

The essence of PBL is buying performance instead of buying individual parts and repair actions (Defense Acquisition University [DAU], March 2005a). Figure 5 presents a good picture of how to acquire total system effectiveness through PBL implementation. The objective of PBL is to keep a certain level of operational effectiveness within reasonable cost limits via partnering with industry.

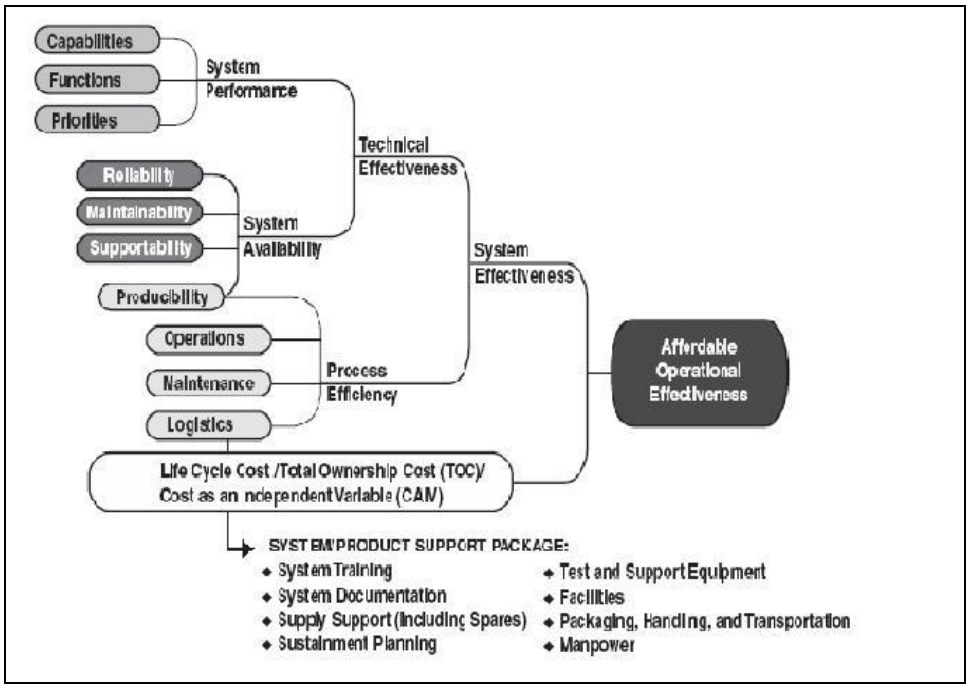

Figure 5. System Operational Effectiveness (Defense Acquisition University [DAU], March 2005b)

C. DOD'S PBL IMPLEMENTATION STRATEGY

The early emphasis on an engineering design that improves operational availability, system reliability, and maintainability (both corrective and preventive) provides the basis for future reductions in support and operations costs through changes in spares distribution and reductions in personnel training costs. The increased emphasis on performance has shifted the focus to the use of commercial standards and industry-identified best commercial practices. Most of the prescriptive standards and specifications which are cited in the statements of work have been eliminated through the implementation of PBL. Some parallel initiatives such as the move toward the use of commercial off-the-shelf (COTS) products have expedited the acceptance of those best practices (Trovato, 2004, 21).

Sources of support decisions for PBL do not favor either organic or commercial support providers. The decision is based upon a best value determination for the warfighter, evidenced through PBL business case analysis (BCA) assessing the best mix of public and private capabilities, infrastructure, skills base, past performance, and proven capabilities to meet agreed upon performance objectives (Defense Acquisition University [DAU], March 2005a). There is no standard implementation rule that applies to every single life cycle project in the DoD inventory. The PM, in cooperation with the Integrated Product Teams (IPT), holds the primary responsibility for the structuring and tailoring the PBL implementation strategy.

The PBL strategy for any specific program or commodity must be tailored to the operational and support requirements of the end item. Similarly, there is no template regarding sources of support in PBL strategies. Almost all of the DoD's system support comprises a combination of public and private support sources (Defense Acquisition University [DAU], March 2005a).

Logistics in PBL can be thought of as the optimal mix of organic development resources of the contractor or original equipment manufacturer (OEM) and other third party vendors, all organized to provide cost effective support for the deployed system (Trovato, 2004, 21). Figure 6 demonstrates the spectrum of PBL strategy applicable

between the traditional organic support and contractor support in which the contractor is responsible for the majority of the support. There is no single optimal mix of organic industry partnering for best practices. Decision makers need to identify the optimal support strategy through a series of business case analyses for each weapon system.

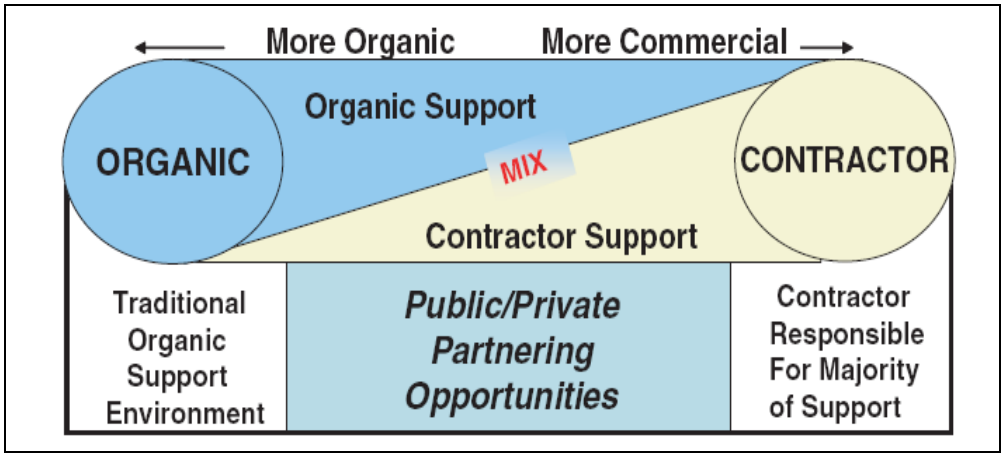

Figure 6. Spectrum of PBL Strategies (Defense Acquisition University [DAU], March 2005a)

The PBL drivers construct the framework of incentives for PBL practices for support provider - in most cases, contractor - and customer.

1. PBL Drivers

In general, the DoD focuses on developing programs designed to enhance performance and reduce total system cost over the life of a weapon system. The desire of the DoD to change the way they conduct business led to the PBL initiative. Seven drivers of PBL were reported by a group of researchers. The following PBL drivers focus on changing the current environment by suggesting strategic dimensions for future implementations (Berkowitz et al. 2004):

- Rising cost of maintenance, operations and support for new and legacy systems. O&M costs of keeping legacy systems fully mission capable (FMC) status becomes more costly as they are getting older. DoD believes that PBL may be a useful tool in terms of meeting warfighter requirements at a fixed level of funding.

- Needed tool for Logistic Transformation and other actions required by Congress. Logistic transformation is an integral part of the Army's transformation. PBL is considered as a tool to enhance a systematic change to the Army's supply chain management.
- Needed reduction of customer wait time in support of the warfighter. PBL addresses DoD's supply chain management issues. The Army showed some progress, albeit slowly, since the Gulf War in 1995 regarding long customer wait times. But it is still a standing problem which necessitates the utilization of cultural transformation in DoD logistics.
- Modernization of weapon systems to enhance combat capability. Complicated DoD defense systems are expensive to sustain and not cost efficient as they become older. Modernization of weapon systems ensures increased capabilities available to warfighters.
- Documented savings from commercial logistics support operations. It is noteworthy that services achieved significant cost savings through PBL practices. According to an evaluation report, The Navy and Marine Corps' F/A-18E/F Super Hornet Strike Fighter aircraft sustainment strategy provides a projected (implemented by NAVAIR Command) cost reduction of $1.4 million over a 30-year life cycle and brings an increase of 10% in aircraft reliability (Gansler and Lucyshyn, 2006).
- Documented improvements from implementation of PBA. For instance, Navy aircraft tires acquisition contract with Michelin exceeds requested performance of 95% readiness rate and guarantees 2-day delivery in CONUS, and 4 days for overseas locations (Gansler and Lucyshyn, 2006).

2. PBL Attributes

The PBL attributes are those characteristics which differentiate it from more traditional acquisition strategies. PBL is the DoD's preferred method of providing support and keeping a preset readiness rate among various systems within budgetary constraints. PBL is considered as a long-term transformational approach with a potential

to stabilize the operation and maintenance costs while promising budgetary savings at a given performance. Following are the most important attributes of PBL/PBA from traditional acquisition methods (Gansler and Lucyshyn 2006).

a. Delineates Outcome Performance Goal(s)

The objective of PBL programs is to buy measurable outcomes, i.e. those measures of effectiveness used to define the outcomes. They should, at the top level, be based on warfighter performance requirements, and include only a few simple, realistic, consistent, and easily quantifiable metrics.

b. Ensures that Responsibilities are Assigned

A PBL effectively switches most of the risk and responsibility for supply chain management from the customer to the supplier. With a PBL contract, the customer understands the true cost of the support, making his financial forecasts and budgets much more accurate.

Since, with PBL, the customer is freed from the detailed supply chain management, he can focus on higher level tasks. These include developing the appropriate performance outcomes, developing a system supply chain strategy, structuring and awarding the contract, and then monitoring and assessing the performance.

c. Reduces Cost of Ownership

PBL, when properly implemented, will reduce the cost of ownership of DoD weapon systems while improving readiness.

d. Incentives for Attaining Performance Goal(s)

Each PBL should be unique and tailored to its program or situation, and strive to be a “win-win” for both the customer and the supplier. The PBL initiative should then fundamentally align the interest of the supplier with that of the customer, and lead suppliers to assume greater responsibility for providing ongoing improvements to their

products. This approach is designed to provide incentives for the supplier, so they are allowed to improve design and processes, and implement commercial best practices.

D. 12-STEP PBL IMPLEMENTATION MODEL

The Defense Acquisition University (DAU) has presented a 12-step PBL implementation model. This model addresses key implementation issues; however, it is important to understand that all PBL implementation are unique, and it is highly unlikely that two different programs will implement PBL in exactly the same way (Defense Acquisition University [DAU], March 2005a). The 12-step PBL implementation model is illustrated below in Figure 7.

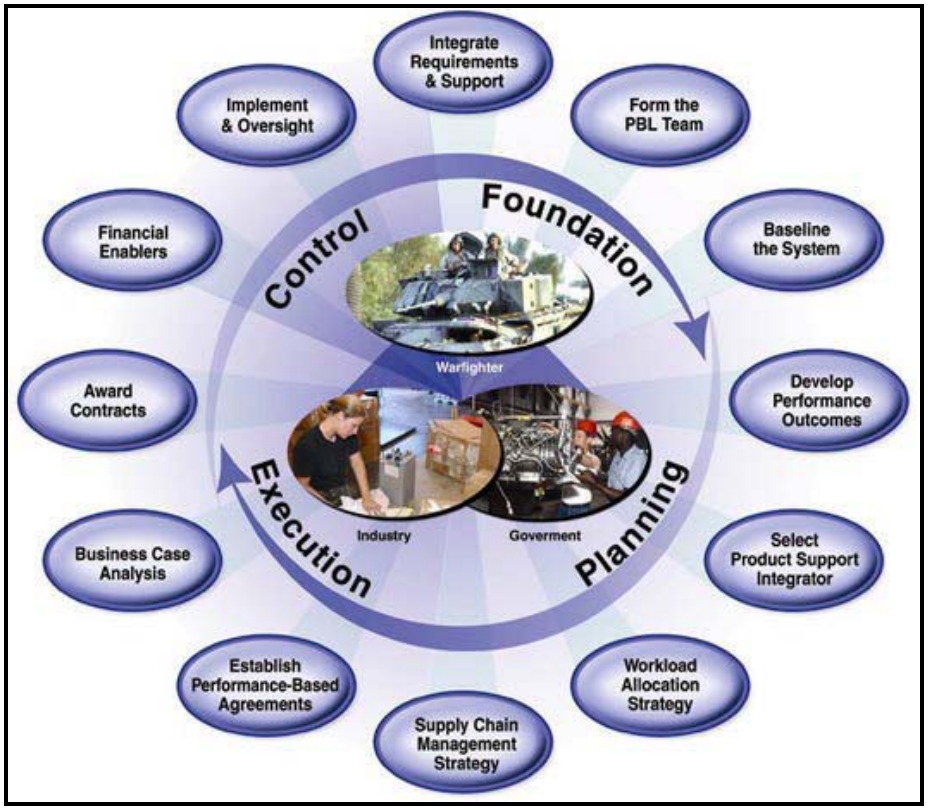

Figure 7. 12-Step PBL Implementation Model (Retrieved from www.dau.mil on April 7, 2007)

DAU's Center of Excellence advises and assists the Program Managers (PM) and Integrated Product Teams (IPT). The PBL process has been prepared to give the PM the

implementation guidelines. In the actual PBL implementation, the order in which these steps are taken may be flexible and not necessarily sequential. The PM and IPTs should tailor and customize the implementation process according to the needs of each case.

The Defense Acquisition University's PBL: Program Manager's Product Support Guide (March 2005) gives step-by-step explanations of the PBL implementation model depicted in Table 1 for DoD organizations.

Table 1. PBL Implementation Process Guidelines (Defense Acquisition University [DAU], March 2005a)

Step 1	Integrate Requirements and Support
Step 2	Form the PPL team
Step 3	Baseline the system
Step 4	Develop Performance Outcomes
Step 5	Select the Provide Support Integrator
Step 6	Develop workload allocation strategy
Step 7	Develop the Supply Chain management strategy
Step 8	Establish Performance Based Agreements
Step 9	Conduct a PBL Business Case Analysis(BCA)
Step 10	Award contracts
Step 11	Employ financial enablers
Step 12	Implement and assess results

1. Integrate Requirements and Support

All acquisition and support activities must be planned and processed according to the needs of the warfighter. The PM team consults the combatant commanders who are the customers for the weapon systems. The capability requirements are translated into

performance and support metrics. PM teams establish the following metrics to address the warfigher requirements (Defense Acquisition University [DAU], March 2005a).

a. Top Level PBL Metrics

The key component of PBL implementation is establishment of metrics, so that achievement of the performance can be tracked, measured and assessed. The Secretary of Defense Acquisition, Technology and Logistics (USD AT&L) approved the use of top level metrics:

(1) Operational Availability (Ao) is the percent of time that a system is available for a mission.

(2) Operational Reliability is the measure of a system in meeting mission success objectives. In other words, it is described as percentage of objectives met.

(3) Cost per Unit Usage is the total operating cost divided by the appropriate unit of measurement for a given system. Depending on the system, this could be flight hour, miles driven or some other service/system-specific metric.

(4) Logistics Footprint is the organic support/contractor presence and size of deployed logistic elements to support and move a system. The metrics could include inventory/equipment, personnel, facility, transportation assets and real estate.

(5) Logistics Response Time is described as the period from when a logistics demand signal was sent to satisfaction of this demand. Logistics demand refers to systems, components and resources required for system logistics support.

One of the critical elements of a PBL strategy is the tailoring of metrics to the operational role of the system and synchronization of the metrics with the scope of responsibility of the product support integrator (PSI).

b. Continuous Evaluation of Warfighter Requirements

The performance requirements may evolve over time as the operational environment evolves and scenarios change. It is essential for the PM team to keep in alignment with warfighter requirements on a continuous basis.

To achieve this flexibility, PBL strategies should be implemented via agreements (contracts, Memorandums of Agreement (MOA), Memorandums of Understanding (MOU), Service-Level Agreements (SLA)) that specify a range of performance outcomes and corresponding metrics sufficient to accommodate changes to resources, Operating Tempo (OPTEMPO), or other usage requirements (Defense Acquisition University [DAU], March 2005a).

2. Form the PBL Team

A critical early step in any PBL effort is team establishment. The team may consist of government and private sector functional experts and should include all appropriate stakeholders, such as warfighter representatives, support providers, etc. Team structure varies depending on the maturity and the mission.

The first step of PBL teambuilding is the setting of achievable goals regarding the life cycle support of the selected program. The PM must ensure to man the team with the right selections and consider minimum impact of resource limitations on the program. Another approach that the PM may follow is a competency-based approach: having the goals set the PM, after eliminating the potential troubles caused by functional structure, achieves system orientation and builds a multi-functional (matrix) management infrastructure.

A typical team can include representatives from following organizations (Defense Acquisition University [DAU], March 2005a):

- A Component Command HQ,
- Logistics (supply, maintenance and transportation) staffs,
- Operational Commands or Defense Agencies,

- Engineering, technical and procurement staff, comptroller, IT organizations, and contract support.

The PBL requires interdisciplinary organizations and teams consisting of professionals with advanced interpersonal, analytic and computer skills, and requires knowledge of contracting, logistics, funds management, metrics and organizational effectiveness and efficiency. It also requires building relationships with contractors and operating from a holistic view of the organization (Berkowitz et al., 2004).

A good PBL team has the following characteristics (Community Connection [DAU], 2007):

- All functional disciplines influencing the weapon system throughout its lifetime are represented on the team.
- All the members buy-in to the team's goals, plans of actions and milestones, responsibilities, and authorities.
- All staffing, funding, and facilities requirements are identified and soundly resourced.

After the team is organized, the members set their goals, develop their plans and milestones and obtain resources from the program stakeholders.

One important responsibility for the IPTs is considering all factors and criteria, the accurate utilization of public/private support strategy design and development in order to achieve an optimum PBL support strategy. The main goal of this strategy must be to use public/private sector capabilities in a cost effective manner.

3. System Baseline

The scope of the system support requirement is defined in this step. The PM and IPT have a better understanding of key stakeholders. The total cost, funds and performance objectives are determined and agreed upon. For the legacy systems, background information regarding performance is gathered. For instance, operational readiness rates and O&M costs relative to the upgraded or new system are determined.

An important step in developing an effective support strategy is the identification of the difference between existing and desired performance goals. The life cycle stage is the determinant of the scope of the baseline. There are particular differences between legacy and fielded systems:

- The legacy system support program is lacking any logistics structure. So a baseline should include the examination of the costs of the replaced systems. If there is no replacement, life cycle cost (LCC) estimates must be calculated. The business model of the system demonstrates its risks and benefits.
- For fielded systems, baseline assessment forms the basis for business case analysis. Operational readiness performance statistics and associated operation and support costs are essential parts to determine the supportability method. Program offices should use actual data for fielded systems.

4. Develop Performance Outcomes

The focus of the performance outcomes and related metrics is the warfighter needs at the highest level. Metrics should focus on the operational availability, reliability and effectiveness of the system, with minimal logistics footprint and a reasonable cost.

User PBAs provide the objectives that form the basis of the PBL effort. Generally, a focus on a few performance based outcome metrics - such as weapon system availability, mission reliability, logistics footprint, and/or overall system readiness levels - will lead to solutions that are more effective. Measures of readiness and supportability performance are balanced against costs and schedules. They link these metrics to the existing warfighter measures of performance and reporting systems.

5. Select the Product Support Integrator (PSI)

A fundamental tenet of PBL is single-point accountability for support. The PM selects a PSI from the government or private sector to coordinate the work and business relationships necessary to satisfy the performance based agreement. While product

support execution is accomplished by numerous organizational entities, the PSI is the single point of accountability for integrating all sources of support necessary to meet the agreed to support/performance metrics. The most likely candidates for the integrator role are:

- The system's original equipment manufacturer or prime contractor;
- An organic agency, product, or logistics command (e.g., DLA, Naval Inventory Control Point (NAVICP), depots);
- A third-party logistics integrator from the private sector;
- The PM's logistics organization.

6. Develop Workload Allocation Strategy

The DoD policy requires that sustainment strategies shall include the best use of public and private sector capabilities through government/ industry partnering initiatives, in accordance with statutory requirements (Undersecretary of Defense (AT&L), 2003). An effective support strategy considers best competencies and partnering opportunities. The PM and PBL team must address each discrete workload and assess where, how and by whom it can best be accomplished. The following factors must be carefully examined to develop an effective support strategy and the optimal sourcing decision:

- Title 10 U.S. Code applicability,
- Existing support process (contract, organic, etc.),
- Existing support infrastructure (in-place, to be developed),
- Best capabilities evaluation (public, private sector market research),
- Opportunities for Public/Private partnerships.

7. Develop the Supply Chain Management Strategy (SCM)

A Supply Chain Management (SCM) strategy is critical to the success of any PBL effort. Supply chain management includes the distribution, asset visibility, and obsolescence reduction of the spare parts. Materiel support is a critical link in weapon systems supportability. All the skilled labor, advanced technology, and performance mean little without the 'right part, in the right place, at the right time.'

There are four categories of supply support items in DoD material management (Defense Acquisition University [DAU], March 2005a). Each category is described below.

a. Unique Repairable Items

These are repairable (subject to repair) parts that are unique to the system (not common with other DoD systems). They are usually sourced by the Prime Vendor/Original Equipment Manufacturer (OEM) of the system. Strong consideration should be given to allocating responsibility for wholesale support of these items to the Prime Vendor, who has readily available technical data and identified sources.

b. Common Repairable Items

These parts are common with other systems and may have a variety of sources. They are usually managed organically within the DoD materiel management process but are also candidates for corporate PBL contracts.

c. Unique Consumable Items

These are consumable (discarded after use) items that are used only on the target system and are usually sourced by the Prime Vendor/OEM of the system. Strong consideration should be given to allocating responsibility for acquisition of these items to the Prime Vendor, which may elect to use the Defense Logistics Agency (DLA) as the preferred source of supply.

d. Common Consumable Items

These are consumable items used across more than a single system and are generally managed and provided by the DLA. It may be viable to allow the Prime Vendor to procure these items, as appropriate, should the DLA be unable to meet time, cost, or quantity requirements. If needed, the PM should encourage establishing a PBA between the DLA and the vendor when total private support is chosen.

8. Establish Performance Based Agreements (PBA)

PBL support is usually documented in a contractual arrangement (commercial, organic or combination of both) where the provider is held to customer oriented performance requirements with the end goal of improving logistics support to the warfighter.

The intent of the PBA is to ensure that all stakeholders (warfighter, the PM and support provider) enter into a formal relationship for levels of support. With a clear delineation of performance outcomes, support requirements, and the resources required to achieve both, the PBA creates a clear understanding of the outcomes and the commitments required to achieve those outcomes among all stakeholders.

All PBL/PBAs should include: performance objectives, responsibilities, reliability growth targets, maintainability improvements, term of contract, flexibility (range of support), Diminishing Manufacturing Sources (DMS)/obsolescence, continuous modernization/improvement, incentives/penalties, and cost reduction/stability.

9. Conduct a PBL Business Case Analysis (BCA)

The PM and PBL team assess alternative scenarios in terms of cost-benefit to meet the PBL objectives of the warfighters compared to the existing support strategies. The PBL implementation strategies vary in accordance with cost, organic support capabilities, operational flexibility, and maximum warfighter supportability.

A PBL BCA should include (Community Connection [DAU], 2007):

- An introduction that defines what the case is about (the subject) and why (its purpose) it is necessary. The introduction presents the objectives addressed by the subject of the case.
- The methods and assumptions that state the analysis methods and rationale that fixes the boundaries of the case (whose costs and whose benefits examined over what time period). This section outlines the rules for deciding what belongs in the case and what does not, along with important assumptions.

- The business impacts are the financial and non-financial business impacts expected in one or more scenarios.
- Risk assessment that shows how results depend on important assumptions, as well as the likelihood for other results to surface.
- Conclusions and recommendations for specific actions based on business objectives and the results of the analysis.

Possible PBL strategies are described in the following paragraphs (Defense Contract Management Agency [DCMA], 2002, 46).

a. PBL-Mini-Stock Point (PBL-MSP)

Conversion of a basic contract for parts/repair of parts/piece part support needs to include storage of government owned material by a contractor. Customer requisitions are automatically routed to the contractor. The contractor (rather than a defense depot) then fills requisitions for this material. The benefit is the quicker issue of customer requirements.

b. PBL-Organic (PBL-O)

An arrangement with a government entity (organic repair depot) via Memorandum of Agreement to store and issue material that is repaired by the same facility.

c. PBL-Commercial (PBL-C)

The contractor supplies commercial off-the-shelf items directly to government end users. Customer requisitions are automatically routed to the contractor.

d. Full PBL

A contractual strategy where the contractor manages the wholesale inventory, determines wholesale inventory levels, repair material as needed, and is required to meet specific performance metrics.

e. PBL-Partnership (PBL-P)

This is similar to a Full PBL, with the addition of an arrangement between the contractor and a government entity (e.g., organic repair depot) where the government entity performs support for the contractor. The government entity in essence becomes a subcontractor to the PBL contractor.

f. Full Contractor Logistics Support

The most robust PBL strategy where the contractor manages most or all facets of logistic support, including inventory levels, maintenance philosophy, training manuals, packaging, handling, shipping and transportation, full configuration control, and support equipment.

10. Award Contracts

Commercial PBA are documented via contracts. The primary guidance for the commercial contracts is the Federal Acquisition Regulation (FAR) Part 12, "Acquisition of Commercial Items." Commercial contract types are briefly discussed below (Gido and Clemens, 2006, 461).

a. Fixed Price Contracts

The customer and the contractor agree on a price on the proposed work. The price remains fixed unless the customer and contractor agree on changes. This type of contract provides low risk for the customer. However, a fixed price contract is high risk for the contractor, because if the cost is more than originally planned, the contractor will make a lower profit than anticipated, or possibly even lose money.

b. Cost-Reimbursement Contracts

The customer agrees to pay the contractor for all actual costs, regardless of the amount (labor, materials etc.), plus some agreed upon profit. This type of contract is

high risk for the customer. Because the customer will reimburse all costs, it is very low risk for the contractor.

Ideally, PBL contracts would be implemented as fixed price. However, the risk is to the government of entering into fixed price contracts prior to establishing a firm cost. Resource and materiel baselines necessitate the frequent use of cost-plus contracting approaches in the early stages of the product support life. PBL strategies will generally have a phased contracting approach, initiated by cost-plus cost-reimbursement type contracts to cost-plus incentive contracts to fixed price incentive contracts over time.

11. Employ Financial Enablers

The PM must ensure having a financial process strategy as an enabler. Single line accounting and single color of money coming from a unique function code are the most preferable. Once the funds are appropriated, the customer must ensure that funds are available to fund the support as defined in the PBA or commercial contract. The PM must be the sole authority to authorize payments and track funds to the accomplished performance.

12. Implement and Assess Performance

The PM's role includes developing a performance assessment plan, monitoring performance, and revising the product support strategy and PBAs as needed.

PMs should perform PSP performance reviews against the PBA on at least a quarterly basis. This data is used in preparing service level assessments of the product support strategies.

E. CULTURAL CHANGE FOR SUCCESSFUL PBL IMPLEMENTATION

Organizational culture is the centerpiece of many concerns and considerations during efforts to adopt business practices commonly used by private organizations to governmental business.

According to a research, organizational culture is "a pattern of beliefs and expectations shared by organizational members". These shared beliefs and expectations determine the behavior of the members of the organization. People tend to surround themselves with others of like opinions and values, thus reinforcing their common beliefs and expectations. Several models for successful change management can be found in the management literature (Berkowitz et al., 2004). Examples of DoD organizations' success in changing the culture of governmental organizations are expressed in Table 2.

Table 2. Comparison of Culture Examples (Berkowitz et al., 2004)

NEW	OLD
The C-17 aircraft is the focus of a Boeing - Air Force partnership. They do joint off sites and work specifically on their relationship. They have joint weekly, monthly, block, etc., meetings and reviews. Every employee who works on the C-17 wears a plastic card the size of their badge, imprinted with the partnership agreement signed by Boeing and Air Force leaders.	• Arms length, adversarial relationship between government and contractor. • All communications in writing to create an audit trail. • Interact as little as possible, conduct bi-annual performance reviews. • Maintain objectivity - don't get too close to the contractor. • Contractor driven by profit motive vs. nation's defense. • Government close holds information.
NAVSEA established an e-marketplace using a one-page flowchart showing what it wanted its electronic services procurement system to look like. The five steps represented the full operating capability (FOC) of the desired system, with the extensions and clouds being areas for future scalability in the eventual system. The Navy simply handed the flowchart to potential vendors and asked them, "How much of this picture can you deliver and at what price?" (IBM - Seaport Study, p. 18)	• Lengthy statements of work developed by government requiring office—with an attempt to document every possible situation, process, regulation, milspec, service, and government expectation for the bidders. • Independent government estimates. • Elaborate processing of Statement of Work through technical data, system engineering, legal, etc., all with organization-specific word requirements.
Air Force Joint Surveillance Target Attack Radar System (JSTARS) Total System Support Responsibility (TSSR) partnership has multiple agreements in place supporting the sustainment of JSTARS. In most cases, these agreements stand alone—they are not part of the contract between Northrop Grumman Corporation (NGC) and the Air Force. The Partnering Agreement (PA) between NGC and the Warner Robbins Air Logistics Center (WR-ALC) has been incorporated into the prime TSSR contract as the guiding basis for the Air Force providing the depot-performed workloads to the contractor.	• Finger pointing between government and suppliers over delays and cost increases. • Request for Proposal describes services and scope of work in great detail. • Numerous change orders as soon as work starts and RFP omissions are identified. • Government defines service delivery means and process through inclusion of government regulations and directives. • Contract administration role vs. partner role. • Only acceptable relationship is a contractual one.

Sikorsky Aircraft Corporation (SAC) is working side-by-side with Corpus Christi Army Depot (CCAD) to reduce repair/overhaul turnaround time for the H-60. This joint collaboration has improved business processes, depot repair methodology, and more responsive product support, with only four contractor jobs directly attributable to the partnership.	• Expert role assigned to government employee. • Use of design specifications where the government tells the contractor how to provide the service. • Contractors in the government workplace viewed as personal service. • Quality assurance processes defined by government specialists. • Government employee relies on guidance from HQ.
The Navy Inventory Control Point (NAVICP) has an F/A-18E/F Integrated Readiness Support Teaming (FIRST) prime contract with Boeing under which the Naval Air Depot (NADEP) North Island performs depot repair services to Boeing. Boeing provides funding, repairable units, repair parts, obsolescence management, and shipping. The NADEP North Island provides touch labor, facilities, technical data, equipment, production engineering, and packaging. Fifty-seven government jobs were created or sustained by this partnership.	• Contractors are taking jobs away from government workers. • Government is buyer of services, not seller. • All payments to government are deposited in the U.S. Treasury account. • Private sector cannot use government facilities and equipment to perform work.

The DLA's changing effort sets a perfect example for the logistic transformation of DoD organizations. DLA initiated a Customer Relation Management (CRM) program to learn more about its customer needs and behaviors. Larry Glasco, DLA's director of Customer Operations and Readiness Directorate (J-4), states:

> CRM is a major effort that will take several years to fully implement. It incorporates the changing world of DoD and customer needs. Ultimately, CRM will transform DLA's enterprise into a true customer-facing Agency by altering the way people, processes and technologies serve as enablers. PBAs serve as an important tool to ensure the customer needs are met (Christensen, 2004, 14-15).

Initially, in an effort to improve customer support, CRM transformed into a program integrating DLA's customer strategies and processes with relevant software to improve customer support and, eventually, national readiness at an affordable cost. At the beginning of the program, the Agency negotiated service-level agreements, or SLAs, with its service customers. In spring 2003, the Office of the Secretary of Defense reviewed LA's SLAs and, redefining ideas contained in them, created PBAs (Christensen, 2004, 14-15).

F. SUMMARY OF PERFORMANCE BASED LOGISTICS

This chapter included a brief overview of the PBL approach as adopted by the DoD. The PBL role in the DoD transformation process was discussed and Defense Acquisition University's (DAU) 12-step PBL implementation model to support major systems was explained in detail. Finally, organizational and cultural dimensions to enhance the implementation were covered briefly.

The next chapter discusses the major weapon system acquisition and support structure and processes for the Turkish Army, legal issues, bidding and contracting methods and related issues. Acquisition and support organizations' roles and responsibilities are briefly reviewed as well.

IV. GUIDELINES OF THE TURKISH ARMY'S SYSTEM ACQUISITION AND SUSTAINMENT PROCESS

A. INTRODUCTION

Turkey has a very important geo-strategic location, connecting three continents: Europe, Asia and Africa via the Middle East. Turkish Armed Forces (TAF) have ensured peace and stability in this critical location since the foundation of the Turkish Republic. Turkey's Ministry of National Defense (MND) is responsible for modernizing TAF in accordance with Turkey's National Military Strategy (TUNMS).

The weapon system requirements of the Turkish Army are met by direct purchase from the domestic and foreign markets or by participation in joint production programs. The acquisition and support phases are performed separately and handled by separate entities. The nature of this approach may be considered traditional.

The cost efficient modernization of the Turkish Army is an issue which may be handled with more effective tools and methods. PBL and PBA have invaluable potential in providing the logistics transformation.

In this chapter, organizational roles and responsibilities, Turkish MND's major system acquisition and procurement process will be discussed, and finally the acquisition and support strategy utilized for the Turkish Army ACV will be reviewed.

B. ROLES AND RESPONSIBILITIES OF ACQUISITION AND SUPPORT ORGANIZATIONS

1. Undersecretariat of Defense Industry

This organization is the backbone of the Turkish Armed Forces weapon system acquisitions and requirements. The system requirements of the Turkish Armed Forces (TAF) are met by direct purchase from the domestic and foreign markets or by participation in joint production programs. The objective is to meet the maximum of the

needs from domestic resources. Project management steps for system acquisitions are initiated by Turkish General Staff approval of the Army requirements.

a. Defense Industry Executive Committee

The main decision making body of the system, the Defense Industry Executive Committee (DIEC), is headed by the Prime Minister and includes the Chief of General Staff and the Minister of National Defense as its members. The Executive Committee has been tasked with the critical decisions relating to defense industrial issues and major defense procurement projects. Another responsibility of the committee has been to render possible nation-wide coordination between all entities with a defense industry dimension.

DIEC assigns the Undersecretariat of Defense Industries (USDI) to manage the projects. The USDI holds the primary responsibility for acquisition management. The USDI is organized as project offices, which also includes representatives of warfighters (end customer), and government organization representatives, depending on the project. The members of the project office from USDI are selected among specialized personnel who are capable of managing economical and technical evaluations and conducting interviews.

Figure 8 demonstrates the organization of the USDI, MND. There are three Deputy Undersecretaries: Administrative and Financial Services, Industrial Services and Defense Services. The Land Platforms Department functions under the Deputy Undersecretary of Defense Services.

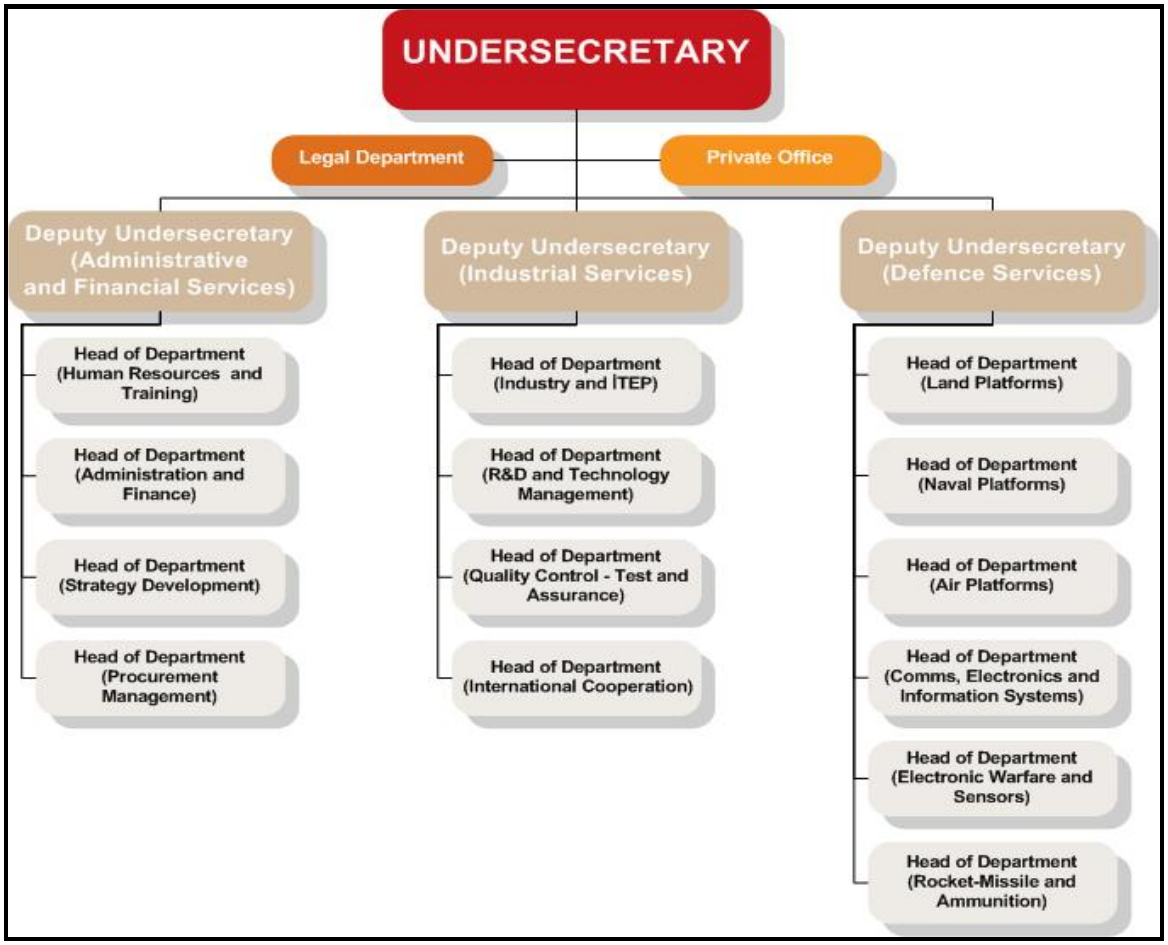

Figure 8. Organization of the Undersecretariat of Defense Industry (USDI) (Retrieved from http://www.ssm.gov.tr/EN/kurumsal/organizasyon/Pages/default.aspx on March 11, 2007)

The main function of the Land Systems Department (LSD), having two sections called Vehicle and Tank, is to meet the land based defense systems' requirements of the Turkish Armed Forces (TAF) and to develop and maintain local defense industry for national defense and security.

Within the project management process, the main goal of the Land Systems Department is to meet TAF requirements with the utmost local content and industrialization in accordance with USDI's strategic targets.

Some examples of projects under the responsibility of the LSD are the Main Battle Tank program aimed to be developed by using national resources and have

all intellectual properties, and the mobile floating assault bridge which is going to be designed, developed, and manufactured by Turkish engineers and industry. Besides these, armored and tactical vehicle procurement and modernization programs of TLFC are under the responsibility of this department.

b. Deputy Undersecretary of Acquisition and Construction, MND (Organic Supply Organization)

Required systems and support parts are procured centrally via two procurement offices: Foreign and Domestic Procurement Offices (Undersecretary of Defense [MND-Turkey], Undated).

- Office, Chief of Foreign Acquisitions: It is responsible for the systems, components, spare parts, and special ammunitions procurement from foreign resources. There are two types of purchasing methods. In the first, the funds are provided by the funding organization of the warfighter. In this case the primary funding method is utilized. The second method is Military Attaché credits. The required parts and components are procured directly from the foreign country manufacturer/contractor. The use of this method for system acquisition depends mostly on urgency and time factors.
- Office, Chief of Domestic Acquisitions: The requirements such as food, military clothing and equipment, oil and side products, ammunition, etc. are procured centrally according to the annual procurement plan. The funds coming from the national defense budget are utilized. There are seven Domestic Acquisition Commands located in different provinces around the country. The annual procurement plan is developed by the Office of Domestic procurements according to the closeness and specifics to the industrial capabilities

c. Division of Research, Development and Technology

The RD&T Division is responsible for supporting the modernization of TAF, as well as developing and managing new projects in order to meet weapon and

equipment requirements of TAF ensuring that modern and up-to-date technologies are incorporated. The RD&T Division accomplishes its duties in compliance with the Defense Industry Policy and Strategy Document. The process is shown in Figure 9.

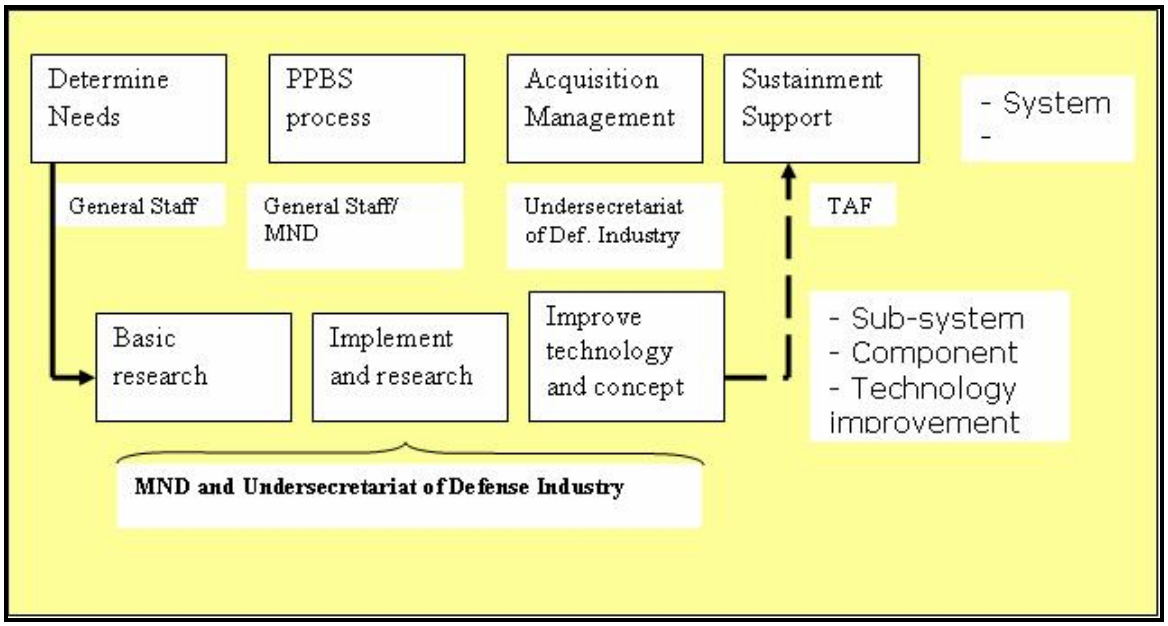

Figure 9. System Improvement Process (USDI Strategic Plan), Retrieved from http://www.ssm.gov.tr/TR/kurumsal/Documents/SP/syh.html on April 10, 2007)

d. Turkish Land Forces Logistics Command (TLFLC)

The Logistics Command is responsible for the Turkish Army's logistic activities, including central acquisitioning procedures, managing inventories, managing Army Depots' activities and recommending improvements to the TLFC.

It is a key organization in terms of logistics transformation. A current initiative to transform the logistic structure and procedures are led by the Logistics Command. Turkish Army reengineering efforts of logistics has goals including various structural, cultural, and procedural changes. PBL implementation, as an important long-term strategy for sustainability and a means of decreasing total ownership costs, is considered a milestone for the logistics transformation efforts of the TLFLC.

C. GENERAL ACQUISITION POLICIES AND PROCEDURES

1. Determination of the Requirements

The Turkish Army major system requirements are discussed and determined in light of Turkey's National Military Strategy (TUNMS) and Joint Operational Concept (JOC). The TUNMS and JOC shed light on the medium and long-term Force Structure and Modernization Plan. The Planning and Programming Directive (PPD) is prepared in the direction of the targets envisaged by the TUNMS. The PPD provides, in a general sense, clarification and orientation on the subject of which of the medium and long-term needs can be met with the available resources.

Service Commands and other authorities prepare "Force Proposals" specifying how much and within which time periods the necessary capabilities are that need to be acquired in the medium and long-term, provided that they meet the fields and criteria specified in the PPD. Next, the Strategic Target Plan (STP) is prepared according to the objectives determined by the TAF for its force structure in the medium and long-term, the main systems required for this structure, readiness for war and maintaining operations.

2. Resourcing for System Procurements and Modernizations

The determination of defense expenses and resources are carried out within the Planning, Programming and Budgeting System (PPBS) framework (Undersecretary of Defense [MND-Turkey], Undated).

a. Planning

Planning is the process of the determination of the medium-term (10 years) and long-term (11-20 years) military strategy, strategic targets and force structure.

b. Programming

Programming is the process of making a project of the targets determined by planning and showing how these objectives will be realized on the basis of resources within a specified time frame.

c. Budgeting

This is the process of deciding where, for what purpose, and how much will be allocated in each specific budget year from the probable resource allocations specified in the Ten Year Procurement Programs (TYPP).

The resources of defense expenses are comprised of:

- Allocated resources from the National Defense Budget,
- Resources from the Defense Industry Support Fund (DISF),
- Resources from the TAF Strengthening Foundation (SF),
- Foreign State or Company Loans Repaid from the Budget of the Undersecretariat of the Treasury,
- Revenues based on the Special Laws of the MND (Undersecretary of Defense [MND-Turkey], Undated).

A significant amount of funds comes from the annual budget of the MND. Budget studies for the next year start in the first half of the current year. In this framework, the "Price Determination and Actual Positions Committee" is formed. A series of directives are published that explain the principles that will be taken as the basis in the preparation of the budget.

The draft budgets of the units prepared by taking the unit prices, actual positions, stock levels and the costs of modernization projects constitute the basis of the defense budget. Then, it is finalized by examinations and arrangements made by the MND. They are sent to the Ministry of Finance every year at the end of July as the budget proposal of the MND for the process of examination to be made first at the Ministry of Finance and subsequently at the Parliament.

d. Financial Plan Preparation

The Financial Plan is a planning document covering the general budget and non-budget resources. The Financial Plan includes the probable allocation of the financial resources, on the basis of the forces and functional expense groups, for the strengthening, modernization and maintaining of the Armed Forces during the related plan period. The Ten Year Procurement Programs (TYPP) are prepared based on this plan. This program is a document including the allocation of resources for the capabilities desired to be attained during the succeeding ten years, with the objective of reaching the force structure and strength specified in the Strategic Target Plans (STP). It specifies the methods and principles related to the utilization of financial resources envisaged to be obtained from various resources and constitutes the basis in the preparation of the 10-year budgets. The current year programs of the TYPP are implemented after it has been brought to the level of resources allocated by the budget and the budget is approved and spending authorization is obtained. The programs implemented are reviewed quarterly and revised as necessary (Undersecretary of Defense [MND-Turkey], Undated).

3. Determination of General Procedures and Procurement Methods

The major systems projects are realized by using the following procedures:

- Domestic Research and Development (R&D),
- R&D in consortiums,
- Production in consortiums,
- Joint procurement through consortiums,
- Domestic and foreign direct procurements.

In recent years, production in consortiums which allows the use of domestic resources and capabilities at the highest possible level and domestic R&D has been of significant importance.

The procedures relative to the acquisition of the major weapon system falls under the responsibility of Planning, Programming, and Investigation Committee (PPIC) at MND. The procurement method is determined according to the results of the research and evaluations completed by the MND.

The public procurement law adopts the following procurement methods: open procedure, restricted procedure, negotiated procedure, direct procurement, design contest, and special procedure for the procurement of consulting services. The preferred method of procurement is open procedure, as all other procedures (including the restricted procedure) can be applied only when special conditions for their use are fulfilled (Sigma Programme (Joint Initiative of OECD and EU), 2005). The procurement methods utilized are those explained briefly in the following paragraphs.

a. Open Procedures

This is a procedure where all bidders can submit their tenders (Turkish Government Public Procurement Authority (PPO), 2002). Turkish open procedures are very similar to the U.S. sealed bid method. The conditions when these methods are used in the U.S. are also similar to conditions under which Turkish procedures are used. The Turkish open procedure and the U.S. sealed bid method are both used to acquire commodities when the requirements are clear, and there is no need to carry on discussions for purposes of clarification (Bozkurt and Guducu, 2005, 20).

b. Restricted Procedures

This is a procedure in which bidders who are invited, following pre-qualification by the contracting entity, can submit their tenders (Turkish Government Public Procurement Authority (PPO), 2002). Procurement of goods, services or works may be conducted by restricted procedure where open procedure is not applicable due to the complexity of the nature of the subject and/or the requirement for high technology. Turkish restricted procedure is also very similar to the U.S. two-step sealed bidding method, while the Turkish direct procurement method is similar to the U.S. simplified acquisition process (Bozkurt and Guducu, 2005, 20).

c. Negotiated Procedures

A negotiated procedure may be applied, where (Turkish Government Public Procurement Authority (PPO), 2002):

- No tender is submitted in open or restricted procedures,
- It is inevitable to conduct the tender procedures immediately,
- Due to the occurrence of specific events relating to defense and security,
- The procurement is of a character requiring a research and development process.

Due to specific and complex characteristics of the works, goods or services to be procured, it is impossible to define the technical and financial aspects clearly.

Most government acquisitions are conducted by open or restricted procedures in Turkey. The main Turkish government acquisition objective can be defined as receiving the "Lowest Price Technically Acceptable (LPTA)" (Bozkurt and Guducu, 2005, 20).

4. Governmental Contracting Method

The only contract type utilized in the Turkish government procurement process is firm-fixed piece. The contractor absorbs the risk involved. Due to the inflexible nature of fixed price contracts, there are hardly incentives for the contractor. Consequently, the lack of potential incentives, such as availability of bonuses, extra fees (i.e., for the PBL contractor), may impact the results. Basically, the contractor will not have any motive to exceed expectations. The warfighter capabilities are negatively affected as well as the flexibility of operating commanders.

In Turkey, the quality of work is determined within the narrow borders of the administrative and technical specifications in which the contractor is willing to provide the lowest quality of goods or services. This approach is mostly necessary for the contractor to make a profit out of a contract. It is widely considered an important limitation to acquire successful results out of PBL implementations for TAF.

As an exception, the Public Acquisitions Regulation authorizes contracting entities to make additional cost reimbursement fees for transportation service acquisitions in case of unexpected fuel cost fluctuations during the contract period. But this is limited only to the contracts with a one-year lifetime, and contractor is requested to prove the fuel cost increases to the procurement authority at predetermined periods mandated in the contract.

5. Evaluation, Inspection and Acceptance

According to the Turkish Acquisitions Contracting Law, inspection and acceptance commissions consists of at least three persons formed within the contracting entities. The senior member is the chairperson of the commission. The commission performs inspection and acceptance procedures on delivered goods or completed work.

If there is a relevant provision in the contract, the related contracting entity may perform inspections in certain stages and intervals on works requiring production or manufacturing processes for purposes of determining whether such processes are being carried out in compliance with the quality and specifications in tender documents. The commissions may have members who perform staged or interval inspections, but not all the members can be elected from those who did the inspections in the production stages.

D. MAIN CHARACTERISTICS OF THE TURKISH ARMY ACQUISITION AND SUPPORT STRATEGIES

1. The Acquisition Process of the Turkish Army Armored Combat Vehicle Project

The acquisition of the advanced Armored Combat Vehicles (ACV) to meet the Army's requirement is one of the milestones of the modernization efforts. It has been one significant program, which included joint-production of the required ACVs with FMS-NUROL consortium in Turkey. This program also incorporated developing the necessary logistic support capabilities and industry (Baran, 2007).

The program consists of two major phases:

- Defense Industry Executive Committee (DIEC) awarded first contract for the procurement of the total of 1,698 ACV platforms made up of four different types: 171 Armored TOW Vehicles (ATV), 170 Armored Mortar Vehicles (AMV), 830 Armored Personnel Carriers (APC), and 527 Armored Combat Vehicles (ACV) to the FMS-NUROL consortium on May 23, 1989. The total contract of the procurement was $1.076 million with 1986 dollars. The inspections and acceptance of the total of 1,698 ACVs was completed in July 2000.
- In order to utilize the benefits and capabilities gained from the first phase of production, DIEC awarded the second contract for production of 551 ACVs domestically to the FMS-NUROL consortium. The total cost of this contract was $338.2 million with a program completion period of five years. The delivery of the ACVs was completed in August 2005.

The ACV Project Office held the acquisition responsibility throughout the project. Turkish General Staff, Turkish Land Forces Command (TLFC) and USDI personnel formed the Project Office. The ACV acquisition program followed five main implementation steps once the contract was awarded to the FMS-NUROL. These steps are defined below.

a. Prototype Production

The prototype production of the platforms is the beginning phase. Products are developed based on the concepts approved by the Turkish Army Training and Doctrine Command. All efforts are set forth by the contractor to manufacture a prototype within technically required specifications.

b. Test and Evaluation

The representatives of the Turkish Army conducted the tests and evaluations on the prototypes. The selected combatant unit personnel are assigned for

specified testing in the field. Upon approval of the project, the next phase is the mass production of the vehicle platforms.

c. Production, Acceptance, Evaluation and Testing

The inspections are performed at the predetermined production phases and/or at the completion of each party of vehicles ready for shipment within the contract terms by inspection commissions.

d. Shipment to the Warfighters

Upon the acceptance of a specific party of vehicle, they are shipped to the combatant units.

e. Guarantee Period

Guarantee starts with the delivery of the vehicles to the warfighter. The Project Office in USDI is responsible for tracking the implementation of the guarantee conditions set forth in the contract. The contractor is responsible for fixing any production related problems on the fielded ACVs.

The role and responsibilities of the Project Office may be summarized as:

> The Project Office worked as the single point of accountability during the overall administration and management of the project including the resolutions during the guarantee period (Undersecretary of Defense [MND-Turkey], Undated).

The Project Office also played an administrative role in preparing the technical qualifications required by the warfighters and evaluating whether the systems meets these requirements.

2. Sustainment Method Utilized by the Turkish Army for ACV

The support strategy implemented for the sustainability of major weapon systems is total life cycle support management (TLCSM). The Turkish Army Logistics Command

is mainly responsible for the operation and maintenance expenditures and budgeting for the major systems. In other words, it is budgeted and procured centrally.

a. Army Region Support Structure

The logistic supply operations are performed via four TLF Supply Depot Commands in each Army region. The Supply Depots are responsible to support the units and other military organizations in their AOR. During the logistics transformation, the supply and maintenance was changed to function-based, such as supply and maintenance. Army logistic entities have been reorganized from brigade level to those of the Logistics Command. The Logistic Support Command at the brigade level assumed all the supply and support operations of the Brigade Combat Team (BCT).

b. Maintenance Organizations and Process

Three level maintenance systems are adopted for maintenance activities in the Turkish Army. These levels are User/warfighter, Unit, and Depot levels. The periodic user maintenance is a routine for the units. The maintenance companies at the brigade level are responsible for providing authorized level of repairs and maintenance for the systems organic to this command. Very costly (above authorized levels) and complicated repair requests are forwarded to the Maintenance Center (MC). The MC provides depot level maintenance and support to the unit. The Supply Depot Commands or Maintenance Centers use the appropriated funds to procure the repair parts if needed. These entities are heavily engaged in supporting the attached combatant units in their area of responsibility (AOR).

Normally, maintenance funds are allocated to each logistic entity for parts, components and similar item procurements. Some components, parts, and lubricant oils are procured centrally, but inventories are procured at different support facilities. The most widely used method of decentralized procurements is negotiated procedures depending on the urgency of the need. The sole contract type of the Turkish government is firm fixed price resembling the lowest price technically acceptable (LPTA). So, the

tenderer who bids the lowest price is contracted to deliver the supplies in accordance with the provision of the administrative and technical specifications.

The Maintenance Centers are specialized on different parts or component repairs. For instance, if a major repair on the engine of a wheeled general purpose vehicle is requested, the engine is recovered and shipped to the Maintenance Center that specializes in this type of repairs. This process generally increases logistic response time and shipping costs. Maintenance Centers and Supply Depots generally use government owned railways and/or trucks for transportation.

The Maintenance Company provides support at the brigade level. It is responsible to perform full preventive maintenance on the unit's assets. However, the repairs are done at the pre-established authorization levels for major systems. Those systems that need major repairs, which exceed brigade authorized spending, are shipped back to the Maintenance Center (MC) in AOR. The outsourcing of maintenance services is a rarely seen practice.

The following issues relative to the systems sustainability are affecting:

- The utilization of the contractors for service and support is up to the TLFLC for authorization. Organic support facilities provide maintenance to the units. The components and spare parts are procured locally by using the appropriated annual funds, which are generally limited. The general contracting methods are open or negotiated procedures. The urgent needs are met by using negotiated procedures within the fund threshold. The procurement commission evaluates three different tenders relative to the required goods
- The reporting system is mostly paper based which doesn't allow for timely updates. The use of the logistics management system on the TAF intranet will allow timely and secure information sharing among logistics commands.

- The brigade level and similar Logistic Support Commands manage their inventories. This gives a certain visibility to the TLFLC within the limitations of the IT. However, there is hardly any asset visibility among the neighboring commands.
- The performance metrics associated with the O&M do not provide any indication about the availability of assets and reliability of the systems. In other words, they are not directly related to the performance.
- Logistic delays are widely seen issues resulting in increased system downtime. This results in the overstress of the remaining systems. Overall, the unit performance is adversely affected from this.
- The need for funds necessary to keep the aging systems operational is rapidly increasing. The adoption of the commercial best practices by logisticians is an inevitable option to release invaluable funds to support modernization efforts.

Turkey's industrial sector is able to present and provide competitive logistic capabilities especially in the ground vehicles industry. The utilization of this industrial potential for military sustainment may be beneficial in terms of not only getting better quality service support, but also adopting better business practices used successfully by the commercial adversaries to the military logistics over a certain period.

E. SUMMARY

In this chapter, organizational roles and responsibilities, Turkish government major system acquisition and procurement processes were discussed. The acquisition and support strategies utilized for the Turkish Army ACV were reviewed. The issues and considerations in procurement, supply and support strategies were also discussed. In the next chapter, an analysis of the DAU's PBL implementation model on Stryker vehicle support compared with the Turkish Army's ACV support will be performed.

V. ANALYSIS OF PBL IMPLEMENTATION MODEL FOR STRYKER INTERIM COMBAT VEHICLE SUPPORT COMPARED WITH THE TURKISH ARMY ARMORED COMBAT VEHICLE SUPPORT STRUCTURE

A. INTRODUCTION

This chapter contains examples of the DoD's PBL model implementation followed by general considerations and constraints of PBL. The study analyzes Stryker Interim Combat Vehicle (ICV) support using DAU's 12-step PBL model. Additionally, the Turkish Army ACV support structure and process is compared with that of the Stryker PBL support.

B. SUCCESSFUL IMPLEMENTATIONS OF PBL SUPPORT STRATEGY

Implementation of PBL was mandated by Quadrennial Defense Review (QDR) in September 2001, and initial guidance is promulgated by the Office of Secretary of Defense (OSD) (Devries, 2005, 242). QDR reveals that the business sector has attained substantial cost savings, and a respective reduction in inventories, by removing unnecessary steps and carefully managing their supply chain (Army Logistician, 2006b, 54).

It is mandated that the DoD will implement PBL to compress the military supply chain and improve readiness for major weapon systems and commodities at a fixed level of funding (Bozkurt and Guducu, 2005, 20). Based on this assessment, the DoD requested PMs to evaluate the applicability of PBL in their programs. The 12-step PBL model has been provided by the Defense Acquisition University (DAU) to the PMs and Integrated Product Teams (IPT). Successful results were achieved in previous PBL model implementations. Top performance metrics explained in Chapter III exceeded the requirements within the firm fixed cost of the contracts. The vendors are motivated by incentives such as utilization of awards and proposals for contract extension.

The DoD 5000 Acquisition Management Model shown in Figure 10 is the standard structure/environment within which major defense acquisition programs will be conducted. The model depicts the generic life cycle for a materiel system. Since PBL can be applied to both new systems and in support of legacy programs, it is important to realize that PBL needs to be a consideration of each phase across the life cycle of system (Deputy Assistant Secretary of the Army [ILS], 2004, 135).

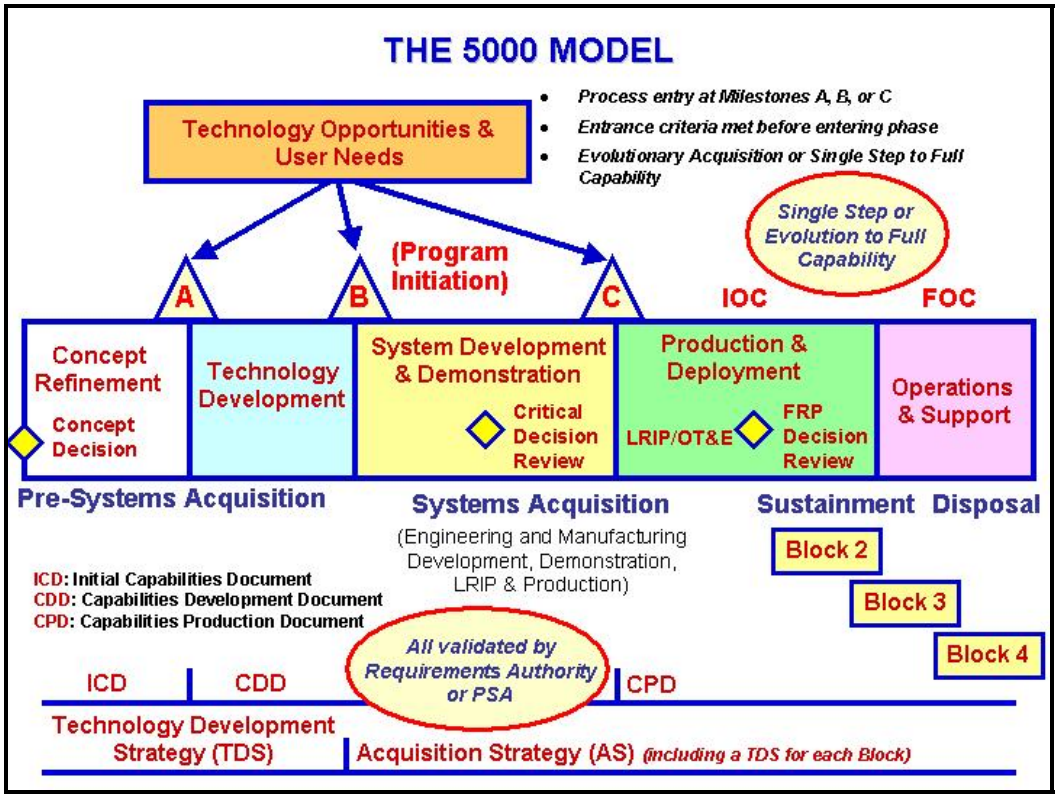

Figure 10. The Acquisition Management (5000) Model (Deputy Assistant Secretary of the Army [ILS], 2004, 135)

Some support models that already utilize contractor logistic support are good candidates for PBL implementation. In other words, PBL implementation follows an evolutionary path from contractor support initiative to full implementation at the weapon system level including services provided by contractor owned teams. These evolutionary phases have already been discussed in Chapter III.

This approach seems to be useful to establish the best practice for overall systems support. The following explains the background and current status of some successful Army implementation examples of the PBL model.

1. Shadow Unmanned Aerial Vehicle (UAV) Support

The Shadow UAV PBL contract's goal is to procure performance using measurable metrics. The performance measures specifically used are System Status Readiness (SSR), Customer Wait Time (CWT), Logistics Maintenance Ratio (LMR), and Field Service Representative Performance (FSR). Figure 11 shows that PBL exceeded its performance goals in the first six-month period including Operation Iraqi Freedom (OIF).

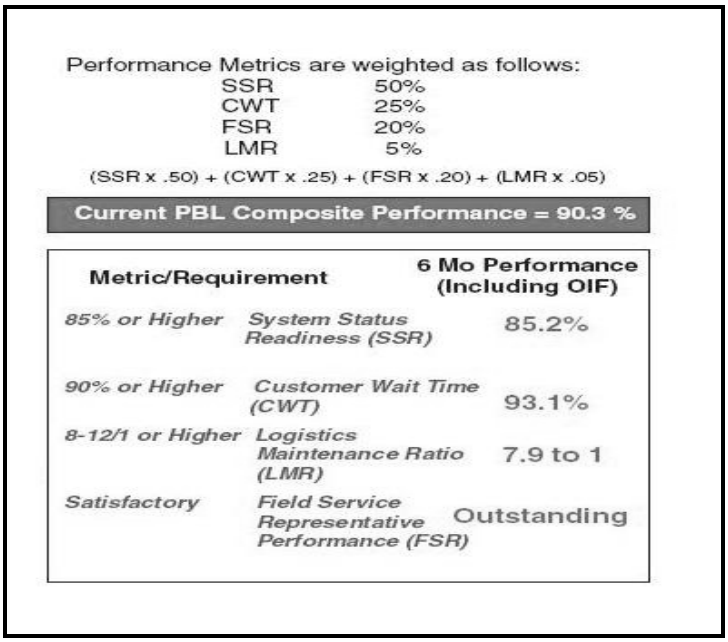

Figure 11. Shadow UAV 6 month PBL Performance result.(Defense Acquisition University[DAU] March 2005a)

2. TOW-ITAS (Improved Target Acquisition System) Support

The TOW-ITAS PBL contract links profitability to availability - the higher the availability the greater the profit the supplier can earn. This program arrangement resulted in 98-100% operational availability since February 2001 (Defense Acquisition University [DAU], March 2005a).

A total of 157 DoD programs out of 215 have either been transformed or were scheduled to be transformed into PBL in July 2006 (Defense Acquisition University [DAU], 2006). However, these initial applications revealed important considerations and promoted the factors in selecting the correct dosage for support strategy selected. It is a

fact that PBL programs need careful tailoring of the model implementation to get the best practices. There are no two programs similar to each other.

C. GENERAL CONSIDERATIONS AND CONSTRAINTS ABOUT IMPLEMENTATION OF THE PBL MODEL

PBL describes outcome performance goals of weapon systems, ensures that responsibilities are assigned, provides incentives to attaining these goals and facilitates overall life cycle management of system reliability, supportability, and total ownership costs (Aldridge, 2002).

Traditionally, support for weapon systems in the DoD focused primarily on the ten or eleven logistics elements split between acquisition-related and life cycle- and sustainment-related activities. Performance metrics are directly related to the results of these activities and have little relationship to warfighter requirements (Devries, 2005, 242).

1. Boundaries and Constraints of PBL Implementation Model(s)

The Assistant Secretary of the Army (AL&T) announced the certain boundaries and constraints consistent with PBL implementation for the Army systems as determined and published by a memorandum in 2005 (Assistant Secretary of the Army [AL&T], 2005):

- Flexibility to be operationally executable and does not infringe on the Commander's ability to execute mission. It is assumed that some PBLs require contractor personnel and equipment to move with the warfighers as in the case of SBCT serving in Iraq. Operational planning and execution requires flexibility. The PBL contract may limit this flexibility and infringe on the Commander's ability.
- Compliance with the Army policy, Contractor Accompanying the Force. Existing Army policy mandates the circumstances in which the contractor must abide by to ensure the requested PBL support. If a system does not

comply with this policy, it generates a constraint to implement PBL effectively and efficiently.

- Total asset visibility of the full system, including supporting equipment and supplies, while providing total asset visibility. It is a requirement to have measurable data to assess the performance of the full system support. Total asset visibility to include equipment and supplies enhances the PM's capabilities to oversee and assess the performance provided throughout PBL implementation.
- Compliance with DoD policy to use Defense Transportation Systems and DoD transportation hubs where practical and where it meets the warfighter's performance requirements. Transportation is an inherent part of logistics and may impact PBL. The DoD's transportation policy and transportation hubs should fit well with the system to ensure performance outcomes.
- Standard Army Management Information System (STAMIS) usage. Where current STAMIS cannot be used, PBL must feed needed information into the STAMIS systems to provide transparency and to preclude adverse impacts on readiness and availability. Transition seamlessly to the Global Combat Support System-Army (GCSS-A) when accepted. This is an important milestone of the total asset visibility. All stakeholders should access and input respective data to the STAMIS and GSSS-Army to measure and manage the PBL.
- Compatibility with emerging doctrine for sustainment operations. For instance, the current policy is two-level (User and Depot levels) maintenance. Elimination of multiple levels helps to provide the maximum support to the warfighter within the closest distance possible. The effectiveness and efficiency of PBL is measured using performance measures and the right amount of logistic support at the right time and place is an important enabler of the overall PBL success. This approach, when implemented correctly, helps to decrease the logistics footprints.

Devries research on the barriers and enablers of effective PBL implementation on 26 DoD and service programs determined the significance of performance metrics, performance based contracting, TLCSM, and commercial off-the-shelf (COTS)/best commercial practices as the strongest enablers for the success of PBL implementation. The barriers mostly encountered are identified as the DoD funding process (PPBS), statutory/regulatory, and structural/cultural areas (Devries, 2005, 242). The mentioned constraints and barriers need to be addressed by the DoD and military services while making a careful evaluation of each program to select and the level of commercial support integrated with the organic support capabilities.

2. Program Selection Criteria for PBL Applicability

The PBL implementation does not promise success for every program. The selection based on objective evaluation criteria is important to obtain the benefits out of implementing PBL. The program selection criteria for the U.S. Army systems contractor support are as follows (Assistant Secretary of the Army [AL&T], 2005):

- Programs currently supported by using traditional sustainment strategy through organic or commercial support.
- Programs requiring minimum logistic requirements, such as wooden round armaments or products under commercial warranties, should maintain existing support strategies.
- There shall be a minimum of five years useful life expectancy for the system in the DoD inventory to adopt PBL.
- The warfighter's stated capabilities shall be achievable and maintainable under the PBL approach with a high level of potential in achieving an increase in system performance.
- The cost per operational unit of performance (i.e., cost per flight hours) can be reduced through the application of the PBL approach. Cost estimating tools, and simulation and cost models will be utilized for cost reduction assessments.

- The risks associated with the implementation of PBL strategy shall be determined to be low to minimum.
- All costs associated with completing the formal Business Case Analysis (BCA) shall be considered an investment to attain future savings.

3. PBL Implementation of PBL Support in the Commercial Sector

In 2004, the Government Accountability Office (GAO) interviewed fourteen commercial sector companies to determine the purpose and environment in which they utilize PBL. Seven of these fourteen companies agreed upon the following principles that they use in the PBL contracting method (Government Accountability Office [GAO], 2004):

a. Non-Competitive Environments

They use the performance based contracting (PBC) selectively when it is cost effective often in non-competitive environments when the manufacturer controls expensive repair parts such as engines. The report points out that, especially for newer systems where reliable technical data is missing, they are more reluctant to implement PBL. On the contrary, the DoD wants to implement the PBL model aggressively for all (both new and older) systems. According to company officials, in the absence of accurate and reliable performance data for the newly established systems to establish a baseline to determine cost effectiveness of a new system's PBC, there is a greater risk that the negotiated risk will be excessive.

b. PBL at the Sub-System or Component Levels

The commercial sector uses PBL at sub-system or component levels such as for engines. DoD's approach, in contrast, is support implementation at the weapon system platform level. The GAO report points out that they could not find any such implementation in the commercial sector. The following are determined as reasons why the commercial sector keeps the PBC limited to sub-system or component level:

- They prefer to take advantage of competition when it is available,

- They gain purchasing power from volume discounts on sub-systems and components across their entire fleet,
- They avoid any administrative costs charged by the Product Support Integrator (PSI).

c. Having Rights of Technical Data to Support Management's Logistical Decision-Making

Should the PSI along with other support provider arrangements fail, the absence of technical data such as detailed maintenance drawings, tolerances etc. limits the decision-making of management on how to evaluate the support of competition among the alternative providers. The companies provide funds to own this integrated technical data, which is deemed important for decision-makers. This is an important limitation for the DoD since the DoD does not pay for the acquisition of technical data rights. The DoD may have technical data when required but not good enough to support competition or alternate source selection in case PBL arrangement with the contractor(s) were to fail.

D. THE U.S. ARMY STRYKER PROGRAM PBL IMPLEMENTATION

In October 1999, the U.S. Army announced the Stryker brigade concept. The Stryker Brigade Combat Team (SBCT) is a unit designed to provide the Army with a rapidly deployable force that is capable of operating against the full spectrum of military threats. To meet the Army's requirements for being rapidly deployable and combat capable, the Stryker brigade relies on new sustainment concepts (Government Accountability Office [GAO], 2006). The Stryker life cycle management strategy has been exemplary in terms of increased operational readiness exceeding expectations. The following briefly explains the basic steps employed for the Stryker ICV acquisition and sustainment.

1. Development and Testing

In November 2000, a joint venture of GM GDLS Defense Group LLC had been awarded the contract to supply the Army with the interim armored vehicle (U.S. Army TACOM Total Life Cycle Management Command, SBCT PM, Undated). Army officials signed a $4 billion contract to produce 2,131 LAVs over six years. The contract's first iteration called for enough LAVs to equip the first Stryker brigade (3rd Bde) at Fort Lewis. The total allocated fund for the initial order was $61.7 million in RDT&E.

2. Production

A six-year requirements contract with an estimated total value of $4 billion to procure 2,131 vehicles in a series of delivery orders starting in 2000 was awarded (Roosevelt, 2004b, 1). General Dynamics Land Systems (GDLS) conducted work in four primary locations. Structure, fabrication, and final assembly of the light armored vehicles (LAV) took place in both Anniston, Alaska, and London, Ontario. Engineering took place in Sterling Heights, Michigan, and upper hull structures were produced at a plant in Lima, Ohio. Many subcontractors at different locations were involved, especially to produce different variations and configurations (Global Security (Electronic Journal), 2007).

3. Fielding

Seven SBCTs, six of which has U.S. Army active components and one reserve component, are in service. Two SBCTs are stationed in Iraq. The Stryker vehicle exceeded expectations with its enhanced technological capabilities, speed reaching 68 mph on the highway, and extra armor protection against hand-held rocket launchers.

4. Product Improvements

The Interim Brigade Combat Teams (IBCT) concept was developed to support the Army’s doctrine of a tactical quick-reaction force rapidly deployable within 96 hours globally. The weapon systems must be deployed by airlift. The armored vehicles in support of the SBCT mission have the following design characteristics: it has to be light

enough to be transportable by aircraft, yet agile with better survival capabilities (i.e., better armor protection against improvised explosive devices). The system design process has been very painful and brought about many flaws since the platform selected was a commercial off-the–shelf (COTS) product converted from a Canadian Light Armored Vehicle (LAV) with tremendous fire power. However, the prototypes became much heavier than predicted in the initial design phases. Table 3 depicts basic specifications of the Stryker vehicle platform.

The Stryker vehicle is considered an important step for the Army's vision for the Future Combat System (FCS). Most of the system improvement responsibility was contracted out to GM GDLS in a joint venture. In other words, GDLS is assigned to integrate the sub-system and component requirements starting from the prototype development, test, evaluation, and modification steps.

5. Garrison and In-Theater Sustainment

Operation and maintenance cost is the biggest funding element for Stryker sustainment support. The support strategy is called Interim Contractor Logistics Support (ICLS). However, it contains many steps of the PBL model readily utilized. It is the aim of this research to identify which model steps are utilized in the progress of contract implementation. The maintenance is done at CONUS and OCONUS locations.

Table 3. Basic Specifications of the Stryker Vehicles (Retrieved from http://www.sbct.army.mil/ on March 25, 2007)

MISSION CAPABILITY	Carries a 9-man infantry squad and crew of 2 Kongsberg remote weapon station with M2 .50 cal MG or MK19 40mm Javelin missiles
SURVIVABILITY	High hard steel structure MEXAS ceramic layer Spall liner IBD passive RPG add-on GFE/ASIOE
ICV MISSION ROLE REQUIREMENTS	Exceptional tactical mobility for full spectrum operations Air transportable in combat ready configuration High baseline vehicle commonality with other variants 14.5 mm integral armor protection (optional RPG-7 armor protection) Battlefield survivability to carry out combat missions Supportability and affordability
SIZE/WEIGHT (INCLUDING BASE ARMOR)	
Length	275 inches
Width	107 inches
Height	104 inches
Combat Weight	GVW 38,000 lbs.(Approx. 17,000 kg)
PERFORMANCE @ GVW	
Maximum speed	60 mph
Maximum range	(40mph) 330 miles
Slope performance: Frontal:	60%
Slope performance: Side	30%
Vertical climb	23 inches
Gap	78 inches
AIR TRANSPORTABILITY	C-130, C-5A, C-17
PERSONNEL	11 total 1 driver 1 vehicle commander 9 troops

6. Utilization of Depot Capabilities

The U.S. Army Tank, Automotive and Armament Command (TACOM) is the primary organization responsible for providing support for the Stryker brigades, which have over 2,100 Stryker vehicles of various types in inventory. Specifically for the Stryker Brigade Combat Team (SBCT) program, both the Organic Depot and contractor maintenance facilities are used in combination. Primarily, the weight of the primary support provider, GDLS, is much higher for the Stryker support.

To support the accelerated development and deployment timeline, the U.S. Army relied on contractors to support the Stryker vehicles. The contractor support within the brigade has duties including conducting maintenance on the Stryker vehicle and managing the Stryker-specific supply chain (Government Accountability Office [GAO], 2006).

E. IMPLEMENTATION AND ANALYSIS OF THE 12-STEP PERFORMANCE BASED MODEL FOR STRYKER ICV SUPPORT IN COMPARISON WITH SUPPORTABILITY FOR THE TURKISH ACV

The DAU's PBL implementation model has been utilized to develop a Stryker-specific PBL model. This model required mostly outside contractor support as mentioned above. This is a required strategy for the reason that the improved digital sensors all around the vehicle are too complicated and assumed to be more costly for the Army to develop these maintenance capabilities. GDLS provided a support organization made up of two echelons. The depot-level support facilities for the six SBCTs are located at CONUS as well as in Iraq.

1. Step 1: Integration of Requirements and Support

Army Acquisition Regulation (AR 70-1) mandated the objective outcome of a system acquisition as the system that represents a judicious balance of cost, schedule, performance, and supportability in response to a user's express need. For that result, Integrated Logistics Support (ILS) management activities are conducted (Headquarters, Department of Army 2003, 100). ILS sets the required structure whereas the PBL is

implemented to supply systems support. There are implementation examples of PBL for both new and fielded systems. The selection of which type of support strategy will be used is mainly based on the total life cycle system support strategy. The PM and IPTs must decide upon utilization of PBL support strategy based on the success of the existing support structure.

Selecting a long-term support strategy for a system or a product requires adaptation of system specific supply chain conclusively from basic system engineering, design and prototype production until the lifetime of the system.

By design, Stryker brigades do not have the capability to sustain operations in remote areas of environment beyond several days or to perform other than minor vehicle repair and equipment maintenance (Government Accountability Office [GAO], 2003). Thus, the brigades require the assistance of external logistics support for essential supply and maintenance services. GDLS assigned a Mobile Service Team moving together with the SBCT in Iraq. They make the urgent repairs as needed and train the troops to make PCMS.

Integrating external logistical support with the brigades' limited support structure is a key concept of the SBCT's organizational and operational design and is essential to effectively supporting and sustaining these brigades in combat (Government Accountability Office [GAO], 2003).

The Stryker Brigade Combat Team (SBCT) project office is primarily responsible to organize, integrate and coordinate the operation and maintenance efforts for the Stryker combat vehicles both at CONUS and OIF. Maintenance requirements have been contracted to the General Motors General Dynamics Land Systems (GM GDLS) joint venture, the OEM for the Stryker family of vehicles.

The Stryker ICV contract was awarded to GM GDLS in November 2000. Thirty months later, the Stryker vehicles were delivered to the 3rd Brigade/2nd Armored Division. Due to the digital complexity of the vehicles, U.S. Army didn't have maintenance capabilities specifically for ICVs. Consequently, maintenance and support are procured from the outside. The GDLS established support capabilities at CONUS

locations to give service support to the Stryker BCTs. It is called Interim Contractor Logistics Support combining service support and procurement of necessary components and spare parts (Dymecki, 2006, 39). The term of the support contract is five years from 2003-2008.

Unlike the Stryker ICV, the FNSS-NUROL's ACV is supported by three echelons of support in the Turkish Army. The Brigade Maintenance Company provides unit level maintenance support. Depot level support is provided by the Maintenance Center (MC) closest to the unit. During a crisis, MCs provide mobile team service and support as an additional repair capability to the Mechanized Brigades. The 65-70% commonality of spare parts with that of aging M113 and ease of repairs enhance the reliability of the ACVs in service.

2. Step 2: Team Formation

The next step is forming the team that is responsible and accountable to implement the PBL agreements and contracts if available. At this step, the PM wants to ensure they are selecting the right people in support of the team's mission. The project management team is established from representatives of stakeholders. This step is also important in establishing constructive partnering relations among stakeholders. The intent of PBL is to form a long-term partnership between industry and the government early in the development of the system or a product that is focused on enhancing warfighter capability over the life of a system or a product (Coogan, 2005, 5). The teams in charge of the PBL implementation may be known by different names. Integrated product support team (IPT) is a name given for the program implementation teams.

The SBCT project office has been established at TACOM in Warren, Michigan. Figure 12 depicts the project team organization. This is a Colonel level organization. The Army personnel assigned to the SBCT support works with GDLS in coordination and cooperation on issues regarding vehicle support with the GM Integrated Logistic Support (ILS) management team. The availability of direct communications facilitates addressing issues faster and better utilization of the resources provided by GDLS in terms of the PBL contracts.

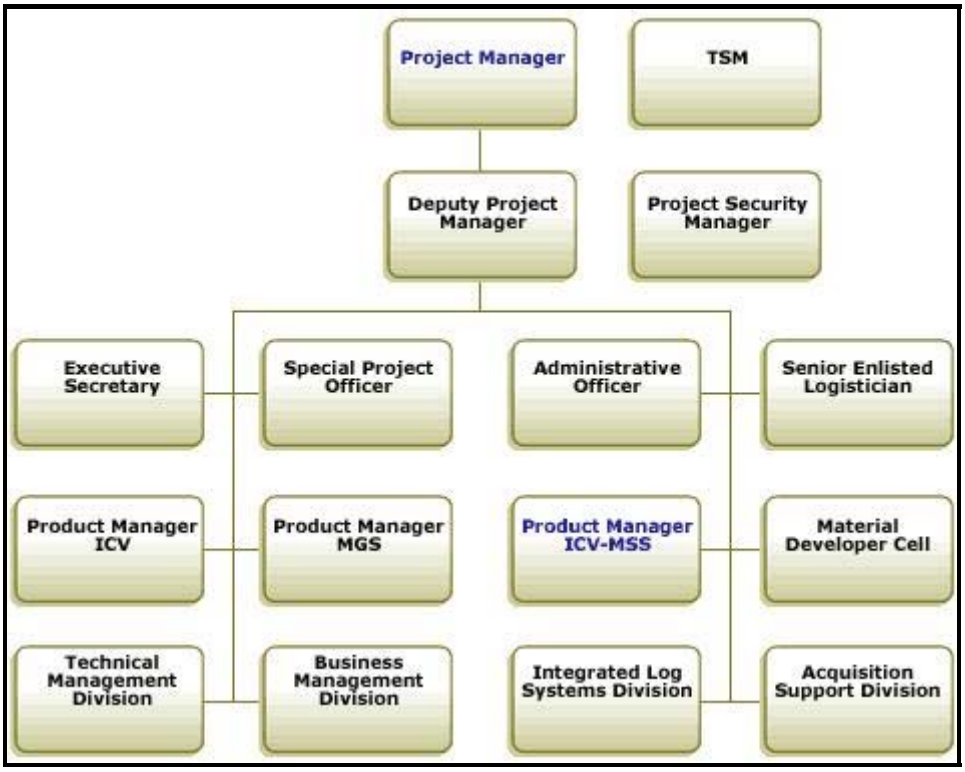

Figure 12. The SBCT Project Team Organization (Retrieved from http://www.sbct.army.mil/ on April 22, 2007)

In the Turkish Army, maintenance and support are provided through coordination with the logistics elements of the attached unit (Corps or Army Chief of Logistics, G4, etc.). According to the regulations, logistic support is a command responsibility and commanders at each level authorizes their logistic branches to accomplish required duties. They may ask for assistance if the organic capabilities are not adequate to one level up in the command structure. The repair and replace authorization and existing repair sets determine the support capability of each level.

3. Step 3: Baselining Stryker Vehicle Support

Defense Acquisition University's (DAU's) PBL Product Support Guide reveals that answering the following questions to define and document a system baseline is required (Defense Acquisition University [DAU], March 2005a).

a. Scope of the Support Requirement

The PM and IPTs need to identify the difference between existing and desired performance requirements. Accordingly, the PM identifies and documents the current performance and cost baseline of a system. The life cycle age of a program determines the required scope of the baselining effort. For new systems such as Stryker vehicles with no logistics structure, the baseline should include the examination of the replaced system. If there is no replacement, system life cycle cost (LCC) estimates should be used (Defense Acquisition University [DAU], March 2005a). For LCC calculations, the U.S. Army used M113 platforms and baselined the Stryker vehicle costs.

According to the Stryker five-year ICLS contract with the GM GDLS Defense Group signed on May 17, 2002, the contractor shall provide logistic support to all Stryker vehicles fielded to the SBCTs. The ICLS contract includes maintenance, supply support, requirements determination for fielded vehicles, field exercises, deployment support preparation, program plans and controls, business administration, logistics planning and feedback. The supply of spare and repair parts, performing requiring unit, and depot level maintenance actions to maintain readiness of all Stryker vehicles is the responsibility of the GDLS.

b. Key Stakeholders

The key stakeholder has been identified as the warfighting units stationed in Iraq. The other one is the contractor itself. Since brigade combat teams (BCT) have very limited organic support capabilities, GDLS has an important role to ensure continuous support. GDLS has a service center approach which includes facilities, equipment, tools, parts and trained technical personnel. GDLS also provides storage facilities where vehicles are regularly serviced. Vehicles in greater need of maintenance are returned to GDLS for refurbishment (Roosevelt, 2006a, 1). The Defense Contract Management Office (DCMA) in supporting the PM office in terms of making the correct rate of contractor support selection has important roles. Other U.S. government stakeholders are the supply agencies: Army Material Command (AMC) and Defense

Logistics Agency (DLA). These organic support providers are to ensure the supply to the ICLS activities should the contractor ask for support.

c. Cost and Performance Objectives

Due to the absence of performance data, most of the cost efficiency measures have been based on the M113 A2 and A3 models of ACV support historical costs. The Army leadership criticizes PBL support for being too expensive. However, there is no relevant research or data pertaining to this opinion. Performance objective was "readiness rate" of the total fleet at the highest level. The SBCT PM team also looked at the other sub-metrics such as logistic response time, availability of spare and repair parts, customer service rates, etc. Several business case analyses were used to keep track of the cost of the selected support structure (Tucker, 2007).

d. Historical Readiness Rate and Operation and Support (O&S) Costs Relative to the Upgraded or New System for Fielded Systems

The Army's standard mission readiness rate is 90%. The contract includes the same readiness rate as one major performance metric. All other sub-metrics are not as relevant as the readiness rate. However, the PM's office says that they also track these sub-measures. But the contractor ensures the providing of the readiness rate as it is expressed in the ICLS contract.

In the Turkish Army, baselining the support activities is not made unless the support would be acquired from commercial resources. Cost-benefit analysis that looks at the quantitative data is much more trusted. Stakeholders are all the units who have a specific system in their inventory. The Turkish Army combat system Fully Mission Capable (FMC) rate is expected to be at the highest possible but not less than two-thirds of the total number of similar combat and combat support equipment. However, it is difficult to generalize a specific percentage of system availability due to logistic and administrative issues for all systems. The ACV FMC rate is assumed to be 85%.

4. Step 4: Developing Appropriate Performance Measures

Determination of the Stryker support concept relies heavily on the following points (Drake, 2006):

- Improved system reliability and ease of maintenance,
- Commonality of spare and repair parts,
- Scheduled maintenance plan,
- System embedded diagnostics.

To develop an effective support strategy, the PM needs to identify the difference between existing and desired performance requirements. The life cycle stage of a program determines the scope of the base lining effort. If there is no replaced system, LCC are estimated by using the replaced system or product (Coogan, 2005, 5).

For PBL, "performance" is defined in terms of military objectives, using the criteria described in subsequent paragraphs.

a. Operational Availability (Operational Readiness)

Operational availability is the percent of time a weapon system is available for a mission or the ability to sustain OPTEMPO. Operational readiness rate has been selected as the top metric for Stryker contractor support.

b. Operational Reliability

Operational reliability is the measure of a weapon system in meeting mission success objectives (percent of objectives met by the weapon system). Depending on the weapon system, a mission objective could be a sortie, tour, launch, destination reached, capability, etc.

c. Cost Per Unit Usage

Cost per unit usage is the total operating cost divided by the appropriate unit of measurement for a given weapon system. Depending on the weapon system, the measurement unit could be flight hour, steaming hour, launch, mile driven, etc. This is

one of the sub-metrics which are tracked by the PM for Stryker support. It is used to look at the logistics costs when SBCTs are deployed to OIF.

d. Logistics Footprints

Logistics footprints are the government/contractor size or "presence" of logistics support required to deploy, sustain, and move a weapon system. Measurable elements include inventory/equipment, personnel, facilities, transportation assets, and real estate. This is not a measure utilized in Stryker support.

e. Logistics Response Time

This is the period of time from when the logistics demand signal is sent to the satisfaction of that logistics demand. "Logistics Demand" refers to systems, components, or resources, including labor, required for weapon system logistics support.

PBL metrics should support these desired outcomes. Performance measures will be tailored by the Military Departments to reflect specific service definitions and the unique circumstances of the PBL arrangements (Wynne 2004).

The major performance metric used in the Stryker performance based contract is readiness rate. Additionally, the PM says that they keep track of other sub-metrics as well. But the contractor success and award distribution decision is based on the overall readiness rate of the Stryker fleet at any given time. Eventually, the Stryker support contract exceeded the Army standard of 90% readiness rate. The monthly readiness rate has reached 95.6% for 1,044 vehicles as of October 15, 2005 (Dymecki, 2006, 39). Figure 13 lists Stryker readiness rates.

Unit	Location	Veh Qty	ORR	Trend
SBCT 1	FLWA	286	92.7%	Steady
SBCT 2	In Transit	273	96.6%	N/A
SBCT 3	AOR	317	90.2%	Steady
SBCT 4	FLWA	122	95.3%	Steady
TF Torch	AOR	39	98.5%	Steady
RTF	AOR	3	100%	N/A
Total Fleet		1044	95.6%	

Figure 13. Stryker ICV Readiness Rates (Dymecki, 2006, 39)

The Turkish Army combat system Fully Mission Capable (FMC) rate is expected to be at the highest possible but not less than two-thirds of the total number of similar combat and combat support equipments. The ACV FMC rate is assumed to be around 85%. During overseas deployments special financial and administrative precautions are authorized by responsible commands to keep the FMC rate above 85% (TLFLC, Email communication, 2007). Direct procurement authority is established to speed up the procurement of the spare and repair parts directly from vendors or QEMs.

The FMC rate and other high-level metrics are gathered and used for performance evaluation of the units and planning purposes only. Maintenance data for the major components such as engine, transmission, optical systems, etc. are used in the cost-benefit analysis of the legacy systems during their life cycle cost evaluations.

5. Step 5: Product Support Integrator (PSI) Selection

The configuration of the total system coverage has utilized the usage of the organic assets. However, performance based contractor support plays a critical role in the Stryker support strategy. Since PMs were to ensure for development and implementation of the product support and PBL strategy and achievement of the desired outcomes during

the sustainment phase, the assumption is that in the overall PM team works as the PSI. However, the GDLS group represents the PSI for the contractor related aspects of the PBL implementation. They consolidate the supply and support provided by sub-contractors to ensure an uncut garrison and combat support of the Stryker vehicles.

Although the major supplier concept has just been adapted to some service acquisitions in the Turkish Armed Forces (TAF), the PSI concept is very new and there has been no implementation so far (TLFLC, Email communication, 2007). In the acquisition process of the new systems, the USDI Project office integrates and administers the acquisition process between supplier/support provider and Turkish government officials.

6. Step 6: Develop Workload Allocation Strategy

Since the Stryker BCT has recently been established and needs an innovative support structure, the PM and product support team have to decide on the right mix of organic and contractor support. It is the assumption of this study that the following factors has been considered to decide about allocating the total workload between organic and commercial support providers (Defense Acquisition University [DAU], March 2005a).

a. Applicability of Title 10 of the U.S. Code

The 50/50 rule is one such rule creating limitations on performance based contracting with the commercial sector depot level maintenance functions. According to 10 USC 2466(a), limitations on the performance of depot level maintenance of materiel contracted out cannot exceed 50% of the overall maintenance need of a material in a fiscal year (Department of Defense [DoD], undated, 2466-2467). However, work performed (at a CITE) by a contractor pursuant to a partnership with funds made available for depot maintenance is not counted for purposes of applying the 50% limitation. This exclusion had applied to contracts entered into during Fiscal Years 2003 through 2009 (Acquisition Community Connection [DAU], 2007).

b. Existing Support Structure

The PM needs to evaluate the existing support of the system. Should the cost-benefit analysis give positive results to continue the existing strategy, the PM should ensure to keep the existing successful strategy, and routinely check how effective the other performance of the existing support method is.

c. Opportunities for Public/Private Partnering

Global supply chains and total life cycle support concepts used by the private sector offer many opportunities in terms of cost saving, better quality, faster service, and mitigation of the logistic footprints, etc. The PM looks for the best practices to increase the system performance required by warfighters. Public and private partnerships may be efficient if the performance results are objectively determined. The PM is the single line of authority to look for these kinds of opportunities.

The SBCT PM utilizes commercial contracts as the performance based portion while getting organic support from the depot level facilities. The organic support is not considered as performance based. The PM is responsible for coordinating and controlling the support activities to continue in a timely manner.

7. Step 7: Develop the SCM Strategy

The purpose of the PBL is to get long-term system support during the total life cycle of it. The effectiveness of PBL applications depends highly on the Total Life Cycle System Management (TLCSM) and supply chains to facilitate the logistic advantages during the PBL implementation.

The U.S. Army TLCSM is applicable for the Stryker wheeled armored vehicle. The absence of the complex maintenance capabilities within the brigades led the U.S. Army to adapt the PBL strategies to use private partners in a good mix with organic support providers. The Stryker supply chain concept consists of the best mix of the performance based contract with GDLS Defense Group (Former GM GDLS joint

venture) and organic depot level support which is provided by Aniston Army Depot Figure 14 shows the support structure for U.S. Army Stryker vehicles.

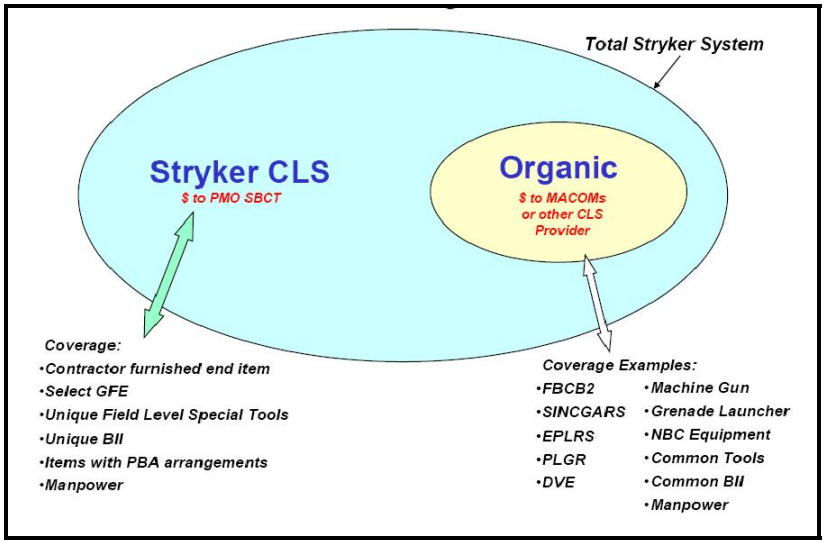

Figure 14. Support Structure for U.S. Army Stryker vehicles (Dymecki, 2006, 39)

According to the ICLS contract with GDLS (May 2002), the group will provide spare and repair parts and perform all field level scheduled and unscheduled maintenance to maintain the readiness of all Stryker vehicles (U.S. Army TACOM LCMC Contracting, 2002).

The contractor provides the Authorized Stockage List (ASL) and Prescribed Load List (PLL) packages to a quantity not to exceed 300 lines initially in accordance with the contract terms. In some cases, the contractor may contact the PM to use government sources of supply, such as Army Material Command (AMC) and Defense Logistics Agency (DLA). The main reason for this is to expedite the availability of an item to meet the performance objectives. The contractor performs all field level Preventive Maintenance Checks and Services (U.S. Army TACOM LCMC Contracting, 2002).

In the case of the Turkish Army's ACV, the organic support provided by Maintenance Centers (MC) is the most important portion. The technical assistance and support provided by the FNSS officials and engineers were very limited and mostly took

place in the early fielding stage of the system. The Army trained its personnel to fix and provide support to the vehicles fielded to the units by FMS-NUROL.

8. Step 8: PBA/Performance Based Contracts (PBC) Establishment

The contract awarded to the GM GDLS joint venture in November 2000 for a six–year period was approximately worth $4 billion to equip its new Brigade Combat Teams (BCT) with 2,131 interim-wheeled vehicles through a series of orders through 2007. Total vehicle orders now stand at 2,548 for seven BCTs. These new armored-wheeled vehicles are the interim step in the U.S. Army's effort to transform itself into a more agile and deployable force. They are assembled at GDLS LLC plants in London, Ontario and Anniston Army Depot (GDLS Defense Systems, 2006).

9. Step 9: Perform PBL Business Case Analysis

According to GAO (Government Accountability Office [GAO], 2005), the DoD concurred with recommendations to enhance implementation of performance based logistics:

- According to the first recommendation, the DoD recognized the need to re-emphasize the use of performance based logistics for sub-systems and components. That said, the DoD also noted that it thought it was still prudent to pursue performance based logistics strategies at the platform level where supported by a business case analysis.
- Regarding the second recommendation, the DoD said that it would take steps to address that issue in the renewed 5000.1 and 5000.2 acquisition policies. The new policy requires a PM to establish a data management strategy that requires access to the minimum data. This is necessary to sustain a fielded system, recompete or reconstitute sustainment if it is required, provide real-time access vice delivery of data and provide for the availability of quality data at the "point of need" for an intended user (Roosevelt, 2004a, 1).

PBL strategies may be applied at the system, sub-system, or major assembly level depending upon program unique circumstances and appropriate business case analysis (Wynne, 2004). PM-BCT requested Army Material System Analysis Activity (AMSAA) perform an independent business analysis of the logistics support options to include full contractor support along with the Army's recommendation for a logistic support concept at the July 22, 2003 Stryker National/Depot Maintenance IPT meeting. The alternative scenarios developed are shown in Figure 15 on the selection of organic versus private sector supply and maintenance.

Alternative	**Supply**	**Maintenance**
Organic	Organic	Organic
Contractor	Contractor	Contractor
Blended 1	Contractor- Stryker unique parts Organic- Common parts	Contractor/ Organic best mix
Blended 2	Contractor- Stryker unique parts Organic- Common parts	Contractor
Blended 3	**Organic**	**Contractor/ Organic best mix**

Figure 15. Logistics Alternatives (AMSAA, 2004, 20)

The life cycle of the ICV assumed 20 years and the analysis is performed on the cost and availability factors with FY2004 constant dollars. Comparison of the scenarios depicted the results shown in Figure 16.

	Org Alt	Ctr Alt	Bld Alt #1	Bld Alt #2	Bld Alt #3
Maintenance	$216	$292	$200	$292	$200
Supply	$5,161	$5,301	$5,307	$5,307	$5,161
Total	**$5,378**	**$5,593**	**$5,507**	**$5,598**	**$5,361**

Figure 16. The Cost Analysis Results of All Scenarios (AMSAA, 2004, 20)

According to AMSAA, the blended maintenance and organic supply alternative (Blended #3) offered the lowest cost solution based on preliminary cost data and assumptions (AMSAA, 2004, 20).

10. Step 10: Award Contracts

The following contracts have been awarded to the GM GBLS Defense Group as cost-plus-fixed-fee contracts to support the Stryker ICVs after being fielded. Table 4 depicts performance based support contracts awarded to the GM GDLS Defense Group as part of the overall support to the Stryker vehicles. Many contracts have been awarded in support of SBCTs by TACOM. This strategy has been accepted to provide the contractor support to SBCTs as needed.

Table 4. Examples of Performance Based Contracts for Stryker Vehicle Procurement and Support (GDLS Defense Group, LLC, 2000, 1)

Support Provider	**Contract type**	**Contracting date**	**Est. completion date**	**Total contract value**	**Subject of contract**
GM GDLS Defense Group	cost-plus-fixed-fee contract	Dec. 15, 2006	Dec. 31, 2007	$40,487,524	battle damage repair
GM GDLS Defense Group	cost-plus-fixed-fee contract	Dec. 15, 2006	Dec. 31, 2007	$33,622,009	battle damage repair
GM GDLS Defense Group	cost-plus-fixed-fee contract	Feb. 2, 2007	Jan. 31, 2008	$8,413,156	delivery (procurement)

The ICLS contract was signed in May 2002 for a five-year term to supply repair parts and to provide garrison and combat zone maintenance support to the SBCTs. The total cost of the ICLS contract is $1.03 billion with FY2002 constant dollars (ICLS Contract, TACOM & GM GDLS, May 2002).

11. Step 11: Employ Financial Enablers

The total cost reached $4 billion for the supply of 2,131 Stryker vehicles. In April 2002, the first lot of vehicles was delivered. Table 5 below displays the total procurement of the Stryker vehicles.

Table 5. Total Number of Stryker Vehicle Procurements (Created based on U.S. Army budgets www.asafm.army.mil/budget/fybm, accessed April 29, 2007)

Fiscal year (*1,000)	Prior years	FY2006	FY2007	FY2008 (estimated)	FY2009 (estimated)
Quantity	2,042	494	100	127	15
Gross Cost	$ 4,713,000	$ 1,318,600	$ 902,500	$ 1,039,000	$ 447,100
Weapon Sys. Procurement	$ 2,300	$ 2,700	$ 9,000	$ 8,200	$ 29,800
Total cost per year	$,715,300	$ 1,321,300	$ 911,500	$ 1,047,200	$ 476,900

The support structure for these Stryker ICVs for these six brigade combat teams (SBCT) was based on the best mix of the organic and private support. The PM SBCT is the main point of responsibility and accountability for continuous garrison and combat zone support. The SBCT IPT oversees organic and performance based agreements to maintain vehicles of the seven SBCTs.

Organic depot facilities such as the U.S. Army Anniston Depot provide support for the weapon systems carried on the vehicle. The support is considered more traditional and operation and maintenance (O&M) funds are allocated and appropriated to fix or replace the broken parts. Table 6 below depicts O&M funds appropriated for Stryker support.

Table 6. Stryker Brigade Combat Teams Support Funds (Created based on U.S. Army budgets www.asafm.army.mil/budget/fybm, accessed April 29, 2007)

FISCAL YEAR	2005	2006	2007	2008 (Estimate)
Actual	$16,200	$29,064	$193,666	$193,666
CLS portion	In actual	$22,192	In actual	$59,967
Total	$16,200	$51,256	$193,666	$253,633
Number of ICVs	586	1503	1842	1843

There are various resources other than the allocations from budgeted national defense budgets for the implementation of acquisition and modernization of the major defense systems in Turkey. These are Defense Industry Support Fund (DISF), the TAF Strengthening Foundation (SF) funds, Foreign State or company loans repaid from the Budget of the Undersecretariat of the Treasury, and revenues based on the Special Laws of the MND. The main authority to make budgeting decisions is the Defense Industry Executive Committee (DIEC). Refer to Chapter IV for more information about DIEC (Undersecretary of Defense [MND-Turkey], Undated).

12. Step 12: Implement and Assess

Stryker platform support, which is more complicated due to the digitalized nature of the vehicles, had been contracted out to the GDLS Defense System (former GM GDLS joint venture) on the requirement-based criteria. The support includes upgrades, modifications, scheduled and unscheduled repairs as required. The contract is intended to provide long-term maintenance and repair capabilities within performance based measures in a nature to align these capabilities with warfighter requirements in garrison and combat areas. The performance based contract covers a five-year term. The company has constructed a Forward Repair Plant (FRP) in Germany and a repair site in Qatar to repair, modify and upgrade battle-damaged Strykers in OIF. ICLS also includes the supply of emergency repair parts, maintenance services and training to the troops. GDLS is awarded several contracts as part of the bigger contract for the Stryker support concept.

Performance based contracting (PBC) is still being implemented. According to Tucker from the PM SBCT office, the PBC for Stryker support is mostly criticized for being too expensive by Army leadership. However, there seems to be no proof to accept that these claims are correct (Tucker, 2007).

The evaluation of the top and sub-metrics to review how they fit in the situation must be performed regularly by the PM IPT on a continuous basis. Lessons learned from Iraq and Afghanistan are integrated into the model. PBL implementation is not a one-time approach. It is a living process and PBAs must be done to verify the support option is still valid and of the least cost against a number of alternative options.

F. OVERVIEW OF THE TURKISH ARMY ADVANCED ACV SUPPORT

1. Background Information on Turkish Army ACV Production

The acquisition of the advanced ACVs has been one significant program which included joint-production of the required ACVs in Turkey. This program also incorporated developing the necessary logistic support capabilities and industry.

A total of 2,225 ACVs were manufactured at the FMS NUROL's Ankara plant and delivered to the various units of the TLFC within two major program phases. The delivery of the vehicles was completed in August 2005.

During the production and acquisition phases, the Undersecretary of Defense Industry's ACV project management office assumed full responsibility and accountability. In other words, the ACV PM functioned as the primary acquisition agency to provide coordination and integration throughout the course of the contract (Undersecretariat of Defense Industry [MND-Turkey], 2007).

The ACV PM office consisted of Turkish General Staff, Turkish Land Forces Command (TLFC) and USDI personnel. The ACV acquisition program followed the main implementation steps defined below (Baran, 2007):

a Prototype Production

The prototype production of the platforms is the beginning phase. All efforts are set forth by the contractor to manufacture a prototype within technically required specifications. Specifications are determined within the working groups consist of the warfighter representatives at the Turkish General Staff.

b. Test and Evaluation

The tests and evaluations on the prototypes are done by representatives of the Turkish Army. The selected combatant unit personnel are assigned for specified testing in the field. Upon approval of the project, the next phase is the mass production of the vehicle platforms.

c. Production, Acceptance, Evaluation and Testing

The inspections are performed at the predetermined production phases and/or at the completion of each party of vehicles ready for shipment within the contract terms by inspection commissions.

d. Shipment to the Warfighters

Upon the acceptance of a specific party of vehicles, FMS NUROL ships them to the combatant units.

e. Guarantee Period

Guarantee starts with the delivery of the vehicles to the warfighter. The project office in USDI is responsible for tracking the implementation of the guarantee conditions set forth in the contract. The contractor is responsible for fixing any production related problems on the fielded ACVs.

The Project Office had worked as the single point of accountability and implementation authority during the overall administration of the ACV project, including the resolutions during the guarantee period (Undersecretary of Defense [MND-Turkey], Undated).

2. Turkish Army's ACV Maintenance and Support

The support strategy for the sustainability of major weapon systems is total life cycle system management (TLCSM). TLFLC holds the responsibility and accountability for operation and maintenance of combatant units and major systems sustainability.

a. Supply Depot and Factory Commands

The logistic supply and support operations are performed by Supply Depot and Factory Commands in four Army regions. The Supply and Factory Commands are responsible for supporting the units and other military organizations in the Army region.

They are responsible to receive, store, supply and provide depot level maintenance to the Corps and Brigades-level units in their area of responsibility (AOR).

b. Levels of Maintenance System

A three-level maintenance system has been adopted for maintenance activities in the Turkish Army. These levels are User/warfighter, Unit, and Depot/Factory levels. Normally PMCS is applied by the user on a weekly basis mandated by the technical manual of the weapon system.

The Maintenance Companies at the tactical brigade level are responsible for providing authorized three-month preventive maintenance, authorized repairs for the weapon systems organic to the brigade command. Higher cost and more complicated repair requests, such as engine and transmission repair requests, are forwarded to the Maintenance Center (MC) serving a specific unit. MCs provide depot/factory level maintenance to the major assets. The Supply Depot Commands or Maintenance Centers use the appropriated funds to procure the supply and repair needs. These entities are heavily engaged in supporting the attached combatant units in their area of responsibility (AOR). Normally, maintenance funds are allocated to each logistic entity for parts, components and similar item procurements. Some components, parts and lubricant oils are procured centrally, but inventories are housed at different support facilities. The most widely used method of decentralized procurements is negotiated procedures depending on the urgency of the need. The single contract type of the Turkish government is firm fixed price awarded to the lowest price technically acceptable (LPTA) offer. So, the tenderer who bids the lowest price is contracted to deliver the supplies in accordance with the provision of the administrative and technical specifications.

MCs have been specialized on different parts or component repairs. For instance, if a major engine repair of a general purpose wheeled vehicle is requested, the engine is recovered and shipped to the Maintenance Center that specializes in this type of repair. This process generally increases logistics response time and shipping costs. Maintenance Centers and Supply Depots generally use government owned railways and/or trucks for transportation.

Should the maintenance and repair capabilities not exist at the depot/factory level, repair supplies and services may be outsourced. However, this practice is limited with the availability of funds appropriated to the unit in the current fiscal year. By regulation, spare and repair parts are procured at the highest possible logistics command with open procedures in order to gain economies from the competition of the manufacturers or vendors. This is especially efficient for commercial off-the-shelf (COTS) products. The vendor with lowest price is contracted for delivery of goods and services.

3. Supply and Support for the Turkish Army ACVs

The Turkish Army Logistics Command has identified the total life cycle cost management model to manage combat system sustainment. The life cycle cost approach is used for all combat systems.

a. Integration of the Acquisition and Support Requirements

Repair and spare part procurement planning is based on the history of consumptions at the depot locations and are consolidated at the TLFLC by regulation. The purpose is to benefit the economies of scale from consolidating requirements and using purchasing power. However, due to the increasing complexity of sustaining new and aging systems with hundreds of different types of component and spare needs is extremely difficult. As part of the logistics transformation, the Turkish Army reorganized its logistic units and created the Mechanized Infantry/Armored Brigades Maintenance Company, the backbone of unit level repairs. This is the midlevel of the three-level maintenance structure.

The Turkish Army Ordnance Corps is working on establishing a web-based Logistics Management System interface working on the intranet system to increase the tracking and supply of warfighter requirements. The completion of this system is assumed to enhance capabilities to better manage inventories. The web interface seems to enhance large amounts of data sharing possibilities. It seems that with the help of a logistic management system, organic capabilities will optimally be utilized and there will

be opportunities to fill the gaps by collaborating with the private sector not only to procure nuts and bolts, but also PBL performance.

Acquisition and support are perceived as separate activities. This is part of the culture in the Turkish Army. We should remember that cultural change is key to the logistics transformation. The ACV project has been started and acquired by oversight and control from the ACV project office at the Undersecretary of Defense Industry. Support and maintenance depend on mostly organic capabilities. The private sector is rarely utilized in terms of provision of support.

b. Multiple Layers of Logistic Units' Responsibility

One of the basic principles needed in order to be successful in PBL implementation is to assign the PM as the single point of responsibility and accountability. In the Turkish Army, the logistics is the responsibility of the command. Commanders depend on the requisition based supply system. In this system, authority of different levels needs to converge to ensure good flow of supplies and spares. The difficulty in managing the complexity of this system creates inefficiencies and ineffectiveness. The lack of effective communication and coordination among these support levels makes the ACV support challenging.

c. Performance Measures do not Align with Warfighter Needs

The performance measures, such as system readiness rate, are measures generally used as statistical information as part of the overall readiness of any tactical unit. The data about operational availability is an important measure to know if the unit is ready for the mission. And this information is used for planning purposes. When we look at the area of logistics, it seems not to be directly relative to address the warfighters' requirements. There is a lack of performance measures to the preparedness of the warfighter.

Normally, a direct exchange for repair parts replenishment is followed based on the availability of requested components or parts. In this method, a broken component/item is exchanged with a serviceable one in an effort to minimize the logistic

downtime. In case the required component is absent, logistic wait time increases. Systems availability dramatically goes down while putting more stress on the functional systems to cause earlier failures.

d. Business Case Analyses are used to Compare Alternatives and Select the Best Scenario

The business case analysis (BCA) is not implemented in the U.S. Armed Services in the same sense as it is in the Turkish Army. In Turkey, logistic planners mostly depend on cost-benefit analysis to make comparisons among alternative scenarios. In the case of ACV support, since the traditional support strategy is utilized, cost-benefit analysis should not necessarily have been done. The supply and maintenance regulations and standing logistic orders describe who, where, when, and how will be supported in garrison or in the area of operations. In some cases, which necessitate making comparisons among alternative scenarios, the highest ranking Operational Commander authorizes officials to do cost-benefit analysis specific to this area and results are evaluated to identify and select the most inexpensive alternative with the highest gains in return.

e. Turkish MND-Private Sector Partnerships Expected to Reduce Total Ownership Costs

Keeping aging systems operational and functional is costly. The need to modernize and update the old systems while keeping the newer systems operational necessitates use of large funds. The savings through decreasing total ownership costs and increasing reliability of systems may result in huge cost savings. For instance, Stryker vehicles maintenance cost were forecasted at $20 per mile in OIF by looking at the M113 data, whereas it achieved cost savings by a $12 spending rate for each mile (Roosevelt, 2004c, 1). The total mileage made was about three million miles when this data was gathered. This result is achieved through a performance based logistics model for the SBCT support. The private sector and government partnerships bring potential gains for both sides.

Turkey's industrial sector has many capabilities especially in vehicle, component and spare parts production and transportation and logistic services enough to provide support to its Military. There seems to be a lot of partnering opportunities to acquire needed supply and services for warfighter support. PBL implementation is one such strategy to enhance this objective in the long run.

G. SUMMARY

This chapter covered the successful PBL model implementation examples followed by general highlights on the considerations and constraints of PBL application. According to the purpose of the study, an analysis of Stryker ICV support using DAU's 12-step PBL model was done. Eventually, major factors in light of the PBL implementation model for the Turkish Army ACV logistic support were discussed to identify the potential benefits of the PBL and TAF-commercial sector partnerships. In the next chapter, the author will put forward the findings of the research and make recommendations for utilizing performance based logistics arrangements in the Turkish Army.

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VI. FINDINGS, CONCLUSION AND RECOMMENDATIONS

A. INTRODUCTION

This chapter consists of findings of the research, conclusion, and recommendations on implementation of PBL using the Defense Acquisition University's 12-step PBL implementation model defined in *Performance Based Logistics*: *A Program Manager's Product Support Guide (March 2005)* for the Turkish Army weapon system support. This research mainly focused on the utilization of the 12-step implementation model for the U.S. Army Stryker ICV supportability. It then compared and contrasted the results with the traditional support method for the Turkish Army's Advanced ACV. It is followed by recommendations focusing on how the Turkish Army should utilize the PBL model in support of major weapon systems for better business practices.

B. FINDINGS AND CONCLUSION

The DoD started to use the PBL procurements in 2001. Program managers have been requested to assess their programs which fall under ACAT I and II categorizations. A majority of the DoD and Armed Services program managers initiated the implementation of the PBL strategy in some way. The Defense Acquisition University (DAU) proposes the 12-step PBL implementation model. However, this model should be considered as guidance which needs to be tailored by the PM to ensure the applicability to any program. The proposed model provides a systematic approach combining critical elements of successful PBL implementation.

The findings are explained below using these critical elements of the DoD recommended approach to PBL implementation.

1. Integration of the Requirements and Support

The benefits of PBL support are getting the same level of support in terms of performance identified by the warfighter. It helps to make respective cost savings while acquiring a pre-agreed to level of support performance. Another benefit is the increase of

the operational reliability starting with the engineering process of the systems. According to the supply chains idea, production, acquisition, and life cycle support are inherently integrated. The PBL concept is a tool to put this integrated strategy into practice. GDLS PBL support became an important logistic solution for SBCTs since it doesn't have the necessary logistic capabilities to sustain. However, the integration of the requirements at the horizontal support level stayed limited. The integration process has been at the BCT level. The commonalities of parts and services with other U.S. Army systems such as FMTV could not be utilized to create a larger PBL strategy.

Since this concept is quite new for Turkish Army logistics, it seems to be beneficial to start with a selective pilot project to improve experience to adapt it into organization and culture.

2. PBL Team Formation and Assigning the Product Support Integrator (PSI)

SBCT PBL teams are expected to manage and control the activities relative to PBL implementation. The PM and project office at TACOM Life Cycle Management Command were assigned as responsible and accountable for the SBCT logistics. The PM organization runs all activities relative to the Stryker support including the number of contracts to procure and support the Stryker ICV all around the world. The performance based support contract with former GM GDLS Defense Group (currently GDLS) in May 2002 provided spare parts, repair, modifications and upgrades for the Stryker variants in various locations. Part of the service-support is provided using the organic capabilities such as the U.S. Army Anniston Depot in Alabama. This portion is not performance based. However, as the PM team was responsible for all SBCT logistic activities, it is supposed that the PSI function is handled by the PM.

For the Turkish Army, supply chain acquisition until fielding of vehicles is managed by the USDI ACV project office. The support activities are managed by the Turkish Army Logistics Command according to the standing laws, regulations and directives. The owning units ensure to get required supply and support respectively from

maintenance companies organic to the brigades and Maintenance Centers under the Logistics Command. Limited outsourcing for COTS systems including ACV is provided if the appropriate funds are in place.

Existing support structure in the Turkish Army doesn't require PM organization. Accountability is the responsibility of owning units in the chain of command. The maintenance actions are taken according the repair authorizations of respective organic support providers. The outsourcing of complicated repairs are contracted by the Logistics Command Procurement Commission either form domestic or foreign providers. In a sense, TLFLC employs as the PSI in the supply chain of combat systems in Turkey.

3. System Performance and Cost Baseline Assessment

After the PBL team is formed it establishes goals, develops action plans and milestones, and obtains adequate funding; the respective step is defining and documenting the existing and required performance. Simultaneously, current performance and a cost baseline is documented by the PM (Defense Acquisition University [DAU], March 2005a). Due to the absence of historical data, M113 performance and support data is used to baseline the Stryker ICV platform. It is estimated by the PM that the support cost per mile of SBCT movement would be $20 in OIF and budgeted at that level. Garrison cost estimates would be even lower. Stryker performance and cost baseline assessments were used in negotiating performance based contracts. In the Stryker ICLS, a cost-plus-fixed-fee contract type is selected.

4. Utilization of Business Case Analysis

According to the U.S. Army PBL Implementation Guide (May 2004), business case is a tool used to manage business process improvement activities from inception through implementation. The BCA is the document where the results from supportability analyses, analysis of alternatives, risk analysis, and cost and economic analysis will be used to validate the product support concept (Deputy Assistant Secretary of the Army [ILS] 2004).

A business case is a document that identifies functional alternatives and presents economical and technical arguments for carrying out alternatives over the life cycle to achieve stated business objectives or imperatives. Essential ingredients of BCA include functional process descriptions, technical architecture descriptions, cost projections including value-added benefits, cost savings and return on investment (ROI), action plans, measures of performance, and risk assessment for each alternative under consideration (Deputy Assistant Secretary of the Army [ILS], 2004).

The Stryker BCAs have been done to fit the supportability analysis. One option among five options has been evaluated to get the highest user value looking at the lowest cost provided. A blend of organic support for weapon and contractor support for platform support has been identified as the highest warfighter value (Dymecki, 2006, 39).

5. Long-term Agreements Established with Product Support Integrator/ Support Provider(s)

The Stryker vehicle fleet strategy proved that the required operational readiness rate of 90%, which has been the U.S. Army's standard for armored vehicles, has been achieved.

The supply chain concept facilitates and requires long term relations. Likewise, in the SBCT supply chain, the government and industry partner for demanded service and support within the same cost limits with better quality, quantity and speed. This research revealed that the ICLS contract has exceeded performance expectations while making cost savings in return. The last five-year SBCT budget revealed that there has been a one-fourth reduction from the actual allocations between FYs 2005-2007 (results are shown in Table 6 in Chapter V). Cost reimbursement contracts seem to be risky for the U.S. Army. However, they seems to be reasonable when compared to the additional benefits such as reduced logistic footprints, increased system reliability, and lower operating costs.

Current procurement and contracting laws and a budgeting process together with acceptance and inspection regulation encourage strict competition and restrict performance based acquisitions in Turkey. It seems that to make PBL contracts attractive for potential suppliers within the legal and statutory standards is hard to accomplish. The

obligations about utilization of technical specifications for procurements make it even harder. Special arrangements are required to adapt and implement the PBL model in the Turkish Army's total life cycle logistics.

6. Assessment of PBL Implementation

The PM's oversight role starts with developing a Performance Assessment Plan and is followed by monitoring performance and revising the product support strategy and PBAs as needed. The PM should perform periodic quarterly assessments of the PSI/PSP against the PBA (Defense Acquisition University [DAU], March 2005a). The DAU's Program Manager's Product Support Guide (March 2005) recommends that the PM review and update the PBA every three to five years after implementation.

Quarterly reviews and service level assessments have been performed for the GDLS contract. The assessments have shown that ICLS has been efficient in terms of getting reliable and seamless service performance. There are some complaints about how expensive it is by senior authorities. However, no cost analysis has been performed so far.

C. RECOMMENDATIONS

PBL has been accepted as the preferred DoD product support strategy to improve weapon systems readiness by procuring performance, which capitalizes on integrated logistics chain and public-private partnerships. The cornerstone of PBL is the purchase of system sustainment as an affordable, integrated package based on output measures such as operational availability, rather than input measures such as parts and technical services (Defense Acquisition University [DAU], March 2005a).

There are great success stories from those programs implementing the PBL approach. The U.S. DoD and service departments used to enjoy the benefits and performance gained through implementation of PBL. The DAU's 12-step model demonstrates PM and IPT way ahead to tailor and implement the performance based contracts (PBC) to acquire the most effective and efficient results.

The Turkish Army started a project to reorganize its logistics structures and capabilities. The integration of the logistic support capabilities is the basis of this effort. Since PBL is such a tool used at various levels (system, sub-system and component) successfully by the DoD for a number of years, it is recommended to improve the Turkish Army weapon system TLCSM process.

Performance based contracts (PBC) originated by private firms used in a way to ensure seamless supply of the supplies when it is cost effective and reduces risk in non-competitive environments. However, they preferred more competitive procurement methods when conditions were suitable. As public logistic agencies don't have the incentives for profit, it is necessary to focus on the performance outcomes and measures. The utilization of the PBL approach for new systems with no historical data is criticized by the General Accountability Office (GAO) for having no valid measures to refer to in the PBL implementation and blamed for being inefficient in cost savings (Government Accountability Office [GAO], 2004).

Although this insight may partly be true, the DoD wants to spread PBL implementation process almost all the DoD systems support. The DoD and services see PBL as a strategic movement to logistics transformation.

To facilitate the faster and more effective adoption of the PBL implementation method into the Turkish Army acquisition and support process, the author proposes the following actions:

1. Suitable Pilot Projects Should be Selected to Implement a PBL Model

PBL implementation is possible at system, component, and parts levels. The level of support is determined during the integration of requirements process. The following issues should be identified during the selection process at the very minimum:

- The time left in the total life cycle of the system or component,
- The current status of the existing support structure's performance,
- The public, private or mixed capabilities availability for sustainment of the system.

Preferably, the existing support provided by the organic facility must be considered in terms of cost effectiveness. The BCAs are useful tools to determine how commercial providers will perform the same support; BCAs must include different alternatives and mixes. The life cycle of the system left is an important determinant to transitioning to PBL. Normally, if a system has more than a 10-year lifetime, it would make sense to implement PBL.

2. Designation of PM and Integrated Support Teams for the Pilot Project

Single point responsibility and accountability in the implementation of PBL projects is of the utmost importance. The PMs may be assigned by HQ TLFC and perform under the Logistics Command to ensure proper coordination and adequate resourcing. The PM should be assigned for respective pilot projects. Integrated support teams must be formed with representatives from all public and private stakeholders under the PM's organization. The team personnel should be separated from their former duties and all their efforts must be focused on the predetermined goals and milestones of the PBL project. Adequate resources must be allocated to the PM team.

3. Contracting Period and Utilization of Statement of Objectives and Performance Work Statement Documents Instead of Technical Specifications Document

Normally, the contracting period is limited to a fiscal year for goods and service procurements. The long-term contracting convinces commercial providers of the funds availability and provides them initiative to get into PBL contracts.

Technical specifications for the procurement of materials in the traditional methods are not applicable in the PBL method. Necessary regulatory arrangements must be performed to ensure the flexibility to waiver technical documents. Instead, Statement of Objectives (SOO) and Performance Work Statement (PWS) documents are written.

The SOO depicts the overall performance objectives and is used during the solicitation phase of the contracts. Its goal is to provide maximum flexibility to each bidder to propose innovative approaches. The PWS is a statement of work for

performance based acquisitions that describes the required results in clear, specific and objective terms with measurable outcomes (Rendon, 2007).

4. Determination of the Performance Metrics

The performance metrics used to measure the support provider's performance helps the PM keep track of how PBL implementation is going. PBL is used both for new and fielded systems in the inventory in the USA. Reliability in cost metrics belonging to the systems predecessor's cost data is argued. Which performance measures should be traced back to the existing support measures is another arguable issue. Preferably, the Turkish Army should select legacy systems as a PBL pilot, which is supposed to have adequate background data. The performance metric selection process must be well coordinated with requesting units. The written memorandum of agreements (MOA) must be documented by the integrated support team (IST) with organic support providers; whereas, PBL contracts takes place of MOAs if contractor support is arranged.

5. Determination of Cost and Performance Baselines

One important condition to initiate PBL agreements is to baseline system against the existing cost and performance. During this step, the PM must agree with the warfighter as to what their mission related performance requirements are and document these as PBL measures. Reasonable and realistic baselines are good incentives for the contractor to exceed these measures, and basically lead to success. In terms of buying performance, the Turkish Army must identify performance baselines for pilot systems as higher than existing ones, yet realistic and applicable. The PM and IPT to include the warfighter representatives and TLFC's financial, personnel, logistics staff should contribute to the system performance and cost baseline as required.

6. Selection of the Performance Support Integrator (PSI)

PSI selection is a key process. The selected PSI, either organic or a commercial one, is assigned to hold responsibility for systems performance based support. For each pilot project in the Turkish Army, it may be more practical to assign one Maintenance

Center (MC) as the PSI. The MC will be responsible for the overall implementation of the performance based support against which the PM will provide performance measures. Due to the nature of the support structure, the MC may choose to use a horizontal model among organic PSPs. For instance, engine, transmission, and weapon may be assigned to separate PSPs. Commercial support may be organized in a vertical model such as engineering, transportation, and training support providers. Integration of all PSPs efforts to form the acquisition of performance is a daily challenge for PSI.

Consolidated performance data from other PSPs must be shared with the PM office. The PM must routinely assess the performance of the PBL project, for instance quarterly, and make necessary proposals to improve the PBL process.

7. Assessment of PBL Implementation

To oversee the success level of the PBL implementation, it is required to have an assessment plan. The PM is responsible to develop an assessment plan. The assessment plan has a dynamic nature. By using quarterly feedback, the PM decides to make amendments on the plan. The requirements as amended must be well communicated with stakeholders. The PM must report to the Logistics Command about the PBL performance. The contract terms should be reviewed every three or five years.

8. Legal and Statutory Amendments are a Must to Facilitate PBL Implementation

Currently, Turkish procurement law has been designed to encourage competition among the bidder on the purchase of various goods and services but not the performance. The key cornerstone of long-term relation building with industry partners requires a balance of risks involved among the government and stakeholders. It is assumed that the profit-making objective of commercial providers will not be satisfied in the fixed price contracting method in the initial stages. To enhance transitioning to PBL, it is considered that the PM should be authorized for cost reimbursement type contracts up to one or two years. This requires the Turkish government action to provide authorization.

Weaving the regular inspection methods and using the SOO and PWS instead will be the keystone of the PBL contract. Data sharing among stakeholders must be well organized through the correct dose of information technology to enhance measurement of performance at the PM locations and assess the results.

D. SUMMARY

This chapter concluded the overall research. This research mainly focused on the utilization of the 12-step implementation model for the U.S. Army Stryker ICV supportability. Findings were compared and contrasted with the traditional supportability method for the Turkish Army Advanced ACV. It is followed by recommendations on how the Turkish Army should utilize the PBL model in support of major weapon systems for better business practices.

In conclusion, the Turkish Army should put the potential of PBL into life through partnering both with public and private support providers. It is recommended to improve the Turkish Army weapon system TLCSM process using PBL. However, the success of the PBL implementation depends highly on the initial evaluation of the selective pilot projects within three-year PBL contracts performed with proposed conditions in the previous sections.

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